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A SURVEY OF THE CAUSES OF HAY FEVER FOR THE STATE OF MINNESOTA*

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BLACKLEY,[4] in 1873, himself a sufferer, furnished the first proof that pollens are the etiological agents of epidemic seasonal hay fever, and incidentally was the first to use the skin tests.

Pollen extracts were first used in the treatment of hay fever in 1905 by Dunbar.[8] His favorable report made increased knowledge of the causes a necessity and furnished the requisite stimuli for investigation which still continues. In the earlier investigations the plants viewed with suspicion were relatively few and many of these unjustly accused. As knowledge increased some were exonerated (*e.g.*, roses and goldenrod) and additional ones incriminated as attention became focused where it correctly belongs, upon those plants the pollens of which are wind-borne.

A number of surveys relative to the plants causing hay fever have been made in various parts of the world. The published reports for regions of the U. S. A. include those for Arizona,[20, 35] California,[21, 24, 30] Colorado,[6, 18, 34, 36] District of Columbia,[3, 5] Illinois (Chicago),[17] Louisiana,[19, 27] Massachusetts (Eastern),[23] Missouri (K. C.),[7] Mid-Southern States,[28] Montana,[12] Nevada,[1] New England,[10, 22, 33] New York,[31, 32] Ohio,[9] Oklahoma,[2] Oregon,[11] Pacific Northwest,[29] Tennessee[14] and Texas.[13, 15, 16] Notwithstanding the importance of these valuable contributions it can yet be said that knowledge concerning the pollens that actually are responsible for the 2,000,000 or more cases of hay fever in the United States is far from complete.

The data compiled from a survey of one locality are useful by way of comparison with the data compiled from another locality, but the conclusions drawn from the one cannot be applied to the other. The species listed in the survey of one region may very nearly coincide with those of another region. However, the proportionate distribution of the species in the two regions may vary greatly and if quantitative distribution is not given proper consideration, important differences may escape detection.

Before attempting the procedure of diagnosis and treatment of cases, it is obviously necessary to know what pollens cause hay fever. In addition, it is imperative to have knowledge of the flowering period and the distribution of the plants, for while some are quite ubiquitous, others are limited in distribution. Nor is the use of such information restricted to the prophylactic treatment of hay fever by injection of pollen extracts. Through careful studies of plant distribution and of the pollen content of the atmosphere, we shall be able to direct sufferers to areas where certain relief may be obtained, once an accurate diagnosis of the specific cause or causes of their condition has been made. By way of illustration, Seattle is the only city of consequence in the United States whose air is not in some degree contaminated with ragweed pollen, this fact having been determined by Durham[23] in 1929. There are areas in Minnesota where ragweed sensitive patients may obtain relief, but those sensitive to other causes are bitterly disappointed when they fail to obtain relief in the same region. Many of those who obtain relief attribute their results to climate, the more correct explanation of plant distribution being overlooked.

The determination of the specific pollen or pollens that are responsible for the illness of an individual patient is by no means simple. While

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correct conclusions are no doubt reached in the majority of cases in the hands of the physician well versed in the hay fever plants of his own region, it can be positively stated that such conclusions are always or at least nearly always inferential. In other words, the conclusion is usually based upon evidence that is circumstantial. A positive skin test does not establish a diagnosis. In addition to this it must be shown that the individual has exposure to this pollen at the time that his symptoms occur. One of us has recently interviewed a patient who was treated with ragweed pollen without benefit. The period of symptoms in this case was from June 1 to July 15, when no ragweed pollen pollutes the air. Furthermore, the skin test to ragweed was negative. Such ignorance on the part of the physician is inexcusable.

The prophylactic treatment of hay fever in Minnesota has of necessity been based upon conclusions drawn from plant surveys of other regions since no corresponding data has been published for this region. In order that the diagnosis and treatment of hay fever may be more rational and exact, the writers have attempted a check upon the hay fever causing weeds of this state.

This report is based upon clinical, field and herbarium studies. Clinical studies include histories and sensitization tests of 100 cases of hay fever among the students at the University of Minnesota selected at random without regard to season of symptoms.

The data in regard to the time of blossoming and the geographical distribution of the species involved have been gathered through many years of field observations in various parts of the state, supplemented by studies of the very extensive collections of Minnesota plants in the University herbarium.

For most of the species enumerated, a considerable length of time is given for the time of bloom. This may be somewhat misleading and a brief explanation is necessary. Seasons vary from year to year. A certain species in a given locality may bloom from one to two weeks earlier one year than another, depending upon the climatic conditions which obtain. This is especially true of those which blossom before the end of May or in other words, before summer temperatures have been definitely established for the region. Furthermore, the plants of the spring season which have an extensive north and south distribution in Minnesota have a considerable blossoming range because of the fact that the northward progress of the season is on the average only 17 miles per day. For plants of the midsummer season, there is very little difference between the southern and northern parts of the state in regard to the time of blossoming, and for plants of the autumn season conditions are usually reversed, those in the north blooming slightly earlier than individuals of the same species farther south. Other variable factors which affect the onset and duration of bloom are differences in the habitat, time of planting of cultivated species, considerable fluctuation in the number of flowers produced; all of which have had to be taken into consideration in making out the dates recorded.

Over 90 per cent of the species listed in this report occur either native or are cultivated in the region of the "Twin Cities" and for the great majority of these the initial figure cited for the blossoming period represents the earliest date on which pollination has been found to occur in this particular area. Although the greatest care has been taken to make the report in regard to the blossoming period as accurate and reliable as possible for the state as a whole, the data for the outlying stations are not as complete nor authentic as those for the "Twin Cities" region. It is therefore suggested that the data for this locality be taken as a basis and that the measure of a 17 miles per day northward advance of the season be applied to determine the approximate opening dates of pollination of the spring and early summer plants for any station in the state.*

Our first step in this study was the compilation of a list of those plants which could be suspected as causes of hay fever. For obvious reasons it is necessary to include only those plants which are regularly wind pollenated so far as the epidemic form of hay fever is concerned. This does not preclude the possibility of hay fever from insect pollenated plants where contact is intimate as in the case of gardeners, or those engaged in the handling of such crops as alfalfa and clover. For this reason, we have included alfalfa and

*According to A. D. Hopkins, other conditions being equal, the variation in the time of occurrence of a given periodical event in life activity in temperate North America is at a general average rate of four days to each 1° latitude, 5° longitude and 400 feet altitude, later northward, eastward and upward in the spring and early summer, and the reverse in late summer and autumn. In other words, the average advance of the season per day is 17 miles northward, 62 miles eastward and 100 feet upward.

clover in our list of potential causes, although they are insect pollenated. These are cut and cured at the stage of bloom and much shattering of the flowers undoubtedly occurs.

given in the first column. Since, however, common names alone are not sufficiently accurate, the proper botanical names are provided in the adjoining column. In the list the dagger (†) is

DISTRIBUTION OF PRINCIPAL GROUPS OF HAY-FEVER PLANTS IN MINNESOTA

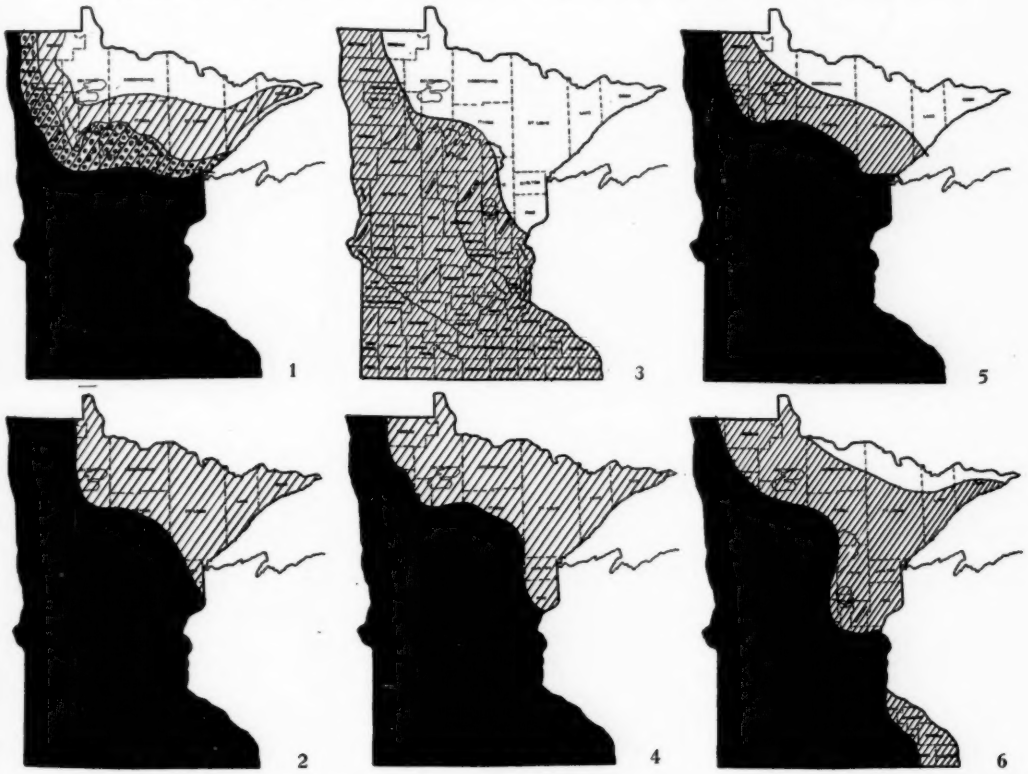

Fig. 1. Ragweeds (Ambrosia). Three species of Ragweed, the Giant, the Common and the Western, occur throughout the black area. The Common Ragweed extends as far as the dotted area and the Western Ragweed to the limit of shading.

Fig. 2. Wormwoods (Artemisia). Six species occur in most parts of the black area. Only two species, *A. biennis* and *A. canadensis*, are found in the cross-shaded area.

Fig. 3. Marsh Elder (*Iva xanthifolia*) occurs in most parts of the cross-shaded area.

Fig. 4. Docks (Rumex). Six species occur in the black area. Only two species, *R. acetosella* and *R. Britannica*, are fairly common in the cross-shaded portion.

Fig. 5. Pigweeds (Amaranthus). Two species, *A. retroflexus* and *A. graecizans*, are common in most parts of the black area. Only *A. retroflexus* extends to the limit of cross-shading.

Fig. 6. Goosefoot and Russian Thistle (Chenopodium, Salsola). Several species of Goosefoot occur in the black and cross-shaded areas. The black marks the approximate limit within the State of the Russian Thistle, *Salsola Kali* var. *tenuifolia*.

In the presentation of the hay fever plants of Minnesota, it has been found convenient to make two separate groupings or lists of the species involved. In the first of these the plants have been arranged seasonally and have been segregated into twenty-four natural groups (see exceptions in footnotes). For the benefit of those who are not familiar with the technical nomenclature, the common or vernacular names of the species are used to designate those species which have been tested in the clinical studies which have been carried on at the University during the last three years. The asterisk (*) marks the species which are of such general distribution, occur in great abundance and produce such quantities of pollen as to constitute a serious menace as hay fever species in most localities of the state. The figure in parentheses following the botanical name is the number under which the species may be found

in an alphabetically arranged descriptive list, which is now in manuscript form and is expected to be published as a supplement to the present study. This descriptive list notes the principal facts about the habitat, occurrence, relative abundance and geographical distribution of all the species included in the survey, and it should be possible to determine from it whether or not a species occurs at any given location in the state.

THE GROUP PRINCIPLE

The basis of the grouping followed in the foregoing list is that of close relationship, with the exception of Group 5, which includes two dis-

A LIST OF HAY FEVER PLANTS BY GROUPS WITH APPROXIMATE DATES OF POLLINATION

Common Name	*Botanical Name*	*Blossoming Season*
1. MAPLE GROUP—ACERACEÆ		
Soft or Silver Maple†	Acer saccharinum (3)	Mar. 12—Apr. 18
Red Maple†	Acer rubrum (2)	Apr. 12—25
Box Elder†*	Acer Negundo (1)	Apr. 12—30
2. BIRCH GROUP—BETULACEÆ		
Hoary or Speckled Alder†	Alnus incana (10)	Mar. 25—Apr. 12
Common Hazel†*	Corylus americana (68)	Apr. 1—20
Beaked Hazel	Corylus rostrata (69)	April 5—25
Green or Mountain Alder†	Alnus crispa (9)	Apr. 15—May 20
Ironwood or Hop Hornbeam†*	Ostrya virginiana (111)	Apr. 22—May 16
Paper or Canoe Birch†*	Betula papyrifera (40)	Apr. 25—May 10
Sweet Fern[1]	Comptonia asplenifolia (67)	Apr. 25—May 30
Bog Birch*	Betula pumila (41)	Apr. 26—May 10
Yellow Birch	Betula lutea (38)	May 1—15
River Birch	Betula nigra (39)	May 1—15
Sweet Gale[1]	Myrica Gale (109)	May 1—25
Blue or Water Beech†	Carpinus caroliniana (56)	May 5—25
3. POPLAR-WILLOW GROUP—SALICACEÆ		
Poplar, Trembling Aspen†*	Populus tremuloides (131)	Apr. 3—22
Pussy Willow	Salix discolor (149)	Apr. 5—25
Large-toothed Aspen	Populus grandidentata (130)	Apr. 8—25
Cottonwood†*	Populus deltoides (129)	Apr. 8—30
Balsam Poplar*	Populus balsamifera (128)	Apr. 15—30
Prairie Willow	Salix humilis (151)	Apr. 15—30
Heart-leaved Willow	Salix cordata (148)	Apr. 20—May 10
Peach-leaved Willow	Salix amygdaloides (147)	Apr. 25—May 12
Crack Willow	Salix fragilis (150)	Apr. 26—May 15
Golden Willow	Salix alba var. vitellina (146)	Apr. 26—May 15
4. ELM-NETTLE GROUP—URTICACEÆ		
American or White Elm†*	Ulmus americana (165)	Apr. 3—24
Slippery Elm†*	Ulmus fulva (166)	Apr. 4—25
Cork Elm	Ulmus racemosa (168)	Apr. 10—30
Siberian Elm	Ulmus pumila (167)	Apr. 10—25
Hackberry†*	Celtis occidentalis (60)	Apr. 20—May 15
White Mulberry	Morus alba (106)	May 15—30
Stinging Nettle†*	Urtica gracilis (169)	June 1—Aug. 15
Hops	Humulus lupulus (95)	July 15—Aug. 5
Hemp†*	Cannabis sativa (51)	July 15—Aug. 10
Wood Nettle	Laportea canadensis (101)	July 5—Aug. 15
False Nettle	Boehmeria cylindrica (42)	July 20—Aug. 15
5. SEDGE-BULRUSH GROUP—CYPERECEÆ		
Peduncled Sedge	Carex pedunculata (52)	Apr. 8—May 3
Pennsylvania Sedge†*	Carex pennsylvanica (53)	Apr. 10—May 20
Long-beaked Sedge†*	Carex longirostris (54)	Apr. 28—May 15
Tussock Sedge*	Carex stricta (55)	May 1—30
River Bulrush	Scirpus fluviatilis (157)	June 9—July 20
Great Bulrush*	Scirpus validus (159)	June 15—Aug. 10
Western Bulrush	Scirpus occidentalis (158)	June 15—Aug. 5
Cat Tail†*[1]	Typha latifolia (164)	July 5—30

[1]Belongs to the Myricaceæ, a separate but closely related family.

[1]Not closely related to the Sedge-Bulrush family, but arbitrarily included here to avoid multiplication of groups.

Common Name	*Botanical Name*	*Blossoming Season*
6. ASH GROUP—OLEACEÆ		
White Ash†	Fraxinus americana (87)	Apr. 15—May 10
Green Ash†*	Fraxinus lanceolata (88)	Apr. 17—May 10
Black Ash†*	Fraxinus nigra (89)	Apr. 18—May 15
7. OAK GROUP—FAGACEÆ		
Bur Oak†*	Quercus macrocarpa (136)	Apr. 30—May 29
Black Oak	Quercus velutina (137)	May 1—15
Hills Oak†*	Quercus ellipsoidalis (135)	May 2—22
Red Oak†*	Quercus borealis (133)	May 5—25
Scarlet Oak	Quercus coccinea (134)	May 7—20
White Oak†*	Quercus alba (132)	May 16—27
8. SWEET VERNAL GRASS GROUP—TRIBE PHALARIDEÆ		
Holy Grass, Seneca Grass*	Hierochloe adorata (92)	May 8—30
Sweet Vernal Grass†	Anthoxanthum odoratum (22)	June 1—July 1
Reed Canary Grass†*	Phalaris arundinaceae (115)	June 5—July 20
9. WALNUT GROUP—JUGLANDACEÆ		
Butternut†*	Juglans cinerea (97)	May 10—26
Black Walnut†	Juglans nigra (98)	May 15—30
Pignut Hickory	Carya cordiformis (57)	May 20—June 5
Shellbark Hickory†	Carya ovata (58)	May 20—June 5
10. PLANTAIN GROUP—PLANTAGINACEÆ		
Rib Grass†*	Plantago lanceolata (119)	May 20—Aug. 1
Common Plantain†*	Plantago major (120)	June 1—Aug. 15
Pursh's Plantain	Plantago Purshii (121)	June 1—July 15
Large-bracted Plantain	Plantago aristata (118)	June 15—Aug. 1
Pale Plantain	Plantago Rugelii (122)	June 20—Aug. 10
11. DOCK OR SORREL GROUP—POLYGONACEÆ		
Sheep Sorrel†*	Rumex acetosella (139)	May 20—July 1
Rhubarb	Rheum rhaponticum (138)	May 25—June 20
Curled Dock†*	Rumex crispus (142)	May 29—July 15
Peach-leaved Dock	Rumex altissimus (140)	June 1—July 15
Golden Dock	Rumex persicarioides (144)	June 1—July 30
Pale Dock†*	Rumex mexicanus (143)	June 6—July 20
Knot Grass, Door Weed	Polygonum aviculare (127)	June 20—Oct. 15
Bitter Dock†	Rumex obtusifolius (145)	July 10—Aug. 15
Great Water Dock	Rumex Britannica (141)	July 10—Aug. 15
12. TIMOTHY GROUP—TRIBE AGROSTIDEÆ		
Mountain Rice	Oryzopsis asperifolia (110)	May 20—June 10
Meadow Foxtail†	Alopecurus pratensis (11)	May 25—July 15
Porcupine Grass	Stipa spartea (162)	June 1—20
Timothy†*	Phleum pratense (116)	June 10—July 25
Red Top†*	Agrostis alba (9)	June 15—Aug. 1
Canada Blue-joint*	Calamagrostis canadensis (49)	June 15—Aug. 1
Long-leaved Reed Grass	Calamovilfa longifolia (50)	July 1—Aug. 10
Satin Grass*	Muhlenbergia mexicana (107)	Aug. 1—Sept. 1
Wild Timothy*	Muhlenbergia racemosa (108)	Aug. 1—Sept. 1
13. BLUE GRASS GROUP—TRIBE FESTUCEÆ		
Low Spear Grass†*	Poa annua (123)	May 22—Sept. 10
June Grass†*	Poa pratensis (125)	May 28—July 10
Hungarian Brome Grass†*	Bromus inermis (47)	May 29—July 15
Crested Koeleria†	Koeleria cristata (100)	June 1—July 15
Canada Blue Grass†	Poa compressa (124)	June 5—July 15
Orchard Grass†*	Dactylis glomerata (71)	June 5—July 15
Slender Fescue	Festuca octoflora (84)	June 5—July 15
Reed Meadow Grass	Glyceria grandis (91)	June 5—July 15
Fowl Meadow Grass*	Poa triflora (126)	June 10—July 20
Sheep's Fescue Grass†	Festuca ovina (85)	June 15—July 25
Cheat, Chess	Bromus secalinus (48)	June 20—July 20
Meadow Fescue†	Festuca elatior (83)	June 25—July 30

Common Name	*Botanical Name*	*Blossoming Season*
13. BLUE GRASS GROUP—TRIBE FESTUCEÆ *(cont.)*		
Fringed Brome Grass	Bromus ciliatus (45)	July 1—Aug. 1
Poverty Grass, Soft Chess	Bromus hordaceus (46)	July 10—Aug. 10
Rattlesnake Grass	Glyceria canadensis (90)	July 10—Aug. 10
Stink Grass†	Eragrostis megastachya (81)	July 20—Sept. 10
Purple Love Grass	Eragrostis pectinacea (82)	July 20—Aug. 5
Reed Grass	Phragmites communis (117)	Aug. 1—Sept. 1
14. RYE GROUP—TRIBE HORDEÆ		
Rye†*	Secale cereale (153)	June 1—20
Quack Grass†*	Agropyron repens (6)	June 10—Aug. 1
Slender Wild Rye	Elymus striatus (79)	June 15—July 15
Squirrel Tail Grass†*	Hordeum jubatum (94)	June 20—Aug. 1
Awned Wheat Grass[1]	Agropyron caninum (5)	July 1—Aug. 5
Slender Wheat Grass†	Agropyron tenerum (7)	July 1—Aug. 10
Nodding Wild Rye	Elymus canadensis (78)	July 5—Aug. 10
Virginia Wild Rye	Elymus virginicus (80)	July 5—Aug. 15
Corn, Maize†*[1]	Zea Mays (174)	July 20—Aug. 20
15. ALFALFA GROUP—LEGUMINOSÆ		
Alfalfa†	Medicago sativa (103)	June 4—Sept. 15
Sweet Clover†	Melilatus alba (105)	June 6—Oct. 1
Red Clover†	Trifolium pratense (163)	June 12—Sept. 15
16. MILLET GROUP—TRIBE PANICEÆ		
Scribner's Panic Grass	Panicum Scribnerianum (112)	June 5—July 10
Switch Grass	Panicum virgatum (113)	July 1—Aug. 10
Pigeon Grass*	Setaria glauca (154)	July 1—Aug. 30
Finger Grass, Crab Grass†*	Digitaria sanguinalis (73)	July 1—Aug. 30
Barnyard Grass†*	Echinochloa Crus-galli (76)	July 1—Aug. 20
Small Crab Grass	Digitaria humifusa (74)	July 10—Sept. 10
Green Foxtail†	Setaria viridis (156)	July 15—Sept. 1
Sandbur†*	Cenchrus carolinianus (61)	July 20—Aug. 15
Italian Millet	Setaria Italica (155)	Aug. 20—Sept. 20
17. OAT GROUP—TRIBE AVENEÆ		
Oat Grass	Arrhenatherum elatius (23)	June 15—July 15
Wild Oat Grass	Danthonia spicata (72)	June 15—July 20
Purple Oat Grass	Melica striata (104)	June 15—July 20
Wild Oats†	Avena fatua (34)	June 20—July 20
Oats†	Avena sativa (35)	July 1—30
18. PIGWEED GROUP—AMARANTHACEÆ		
Pigweed, Red-root†*	Amaranthus retroflexus (18)	June 15—Sept. 15
Green Amaranth	Amaranthus hybridus (17)	June 15—Aug. 30
Tumbleweed†*	Amaranthus graecizans (16)	June 20—Aug. 30
Prostrate Amaranth	Amaranthus blitoides (15)	July 1—Aug. 20
Water Hemp	Acnida tuberculata (4)	July 1—Aug. 20
Cockscomb	Celosia argentea (59)	July 1—Sept. 10
19. RUSSIAN THISTLE GROUP—CHENOPODIACEÆ		
Lamb's Quarter†*	Chenopodium album (62)	June 15—Sept. 30
Strawberry Blite	Chenopodium capitatum (63)	June 30—Aug. 15
Narrow-leaved Goosefoot†	Chenopodium leptophyllum (65)	July 1—Aug. 15
Red Goosefoot	Chenopodium rubrum (66)	July 1—Aug. 20
Maple-leaved Goosefoot*	Chenopodium hybridium (64)	July 1—Sept. 15
Russian Pigweed	Axyris amaranthoides (36)	July 1—Aug. 15
Western Blite	Dondia depressa (75)	July 1—Aug. 15
Russian Thistle†*	Salsola Kali var. tenuifolia (152)	July 5—Aug. 30
Kochia, Burning Bush†*	Kochia scoparia (99)	July 12—Aug. 30
Winged Pigweed	Cyclcloma atriplicifolia (70)	July 15—Aug. 30
Shad Scale†	Atriplex patula (33)	July 25—Aug. 30

[1]Does not belong to the Rye Tribe, but is inserted here to avoid multiplication of groups.

Common Name	*Botanical Name*	*Blossoming Season*
20. GRAMA GRASS GROUP—TRIBE CHLORIDEÆ		
Hairy Mesquite Grass	Bouteloua hirsuta (44)	July 1—Aug. 10
Racemed Grama Grass	Bouteloua curtipendula (43)	July 5—Aug. 5
Beckmannia†	Beckmannia erucaeformis (37)	July 10—Sept. 1
Tall Marsh Grass	Spartina Michauxiana (161)	July 15—Aug. 15
Goose Grass†	Eleusine Indica (77)	July 20—Sept. 15
21. WILD RICE GROUP TRIBE ORYZEÆ		
Indian Rice, Wild Rice†*	Zizania palustris (176)	July 5—Aug. 10
Wild Rice†	Zizania aquatica (175)	July 10—Aug. 1
Rice Cut Grass†	Leersia oryzoides (102)	July 20—Aug. 10
22. SAGE-WORMWOOD GROUP—COMPOSITÆ (ANTHEMIDEÆ)		
Common Mugwort*	Artemisia vulgaris (32)	July 6—Sept. 1
Absinth†	Artemisia absintheum (24)	Aug. 1—Sept. 15
Wild Wormwood*	Artemisia caudata (29)	Aug. 1—Sept. 10
Linear-leaved Wormwood†*	Artemisia dracunculoides (28)	Aug. 1—Sept. 15
Pasture Sage†	Artemisia frigida (29)	Aug. 5—Sept. 20
Prairie Sage†*	Artemisia ludoviciana (incl. gnaphalodes) (30)	Aug. 5—Sept. 20
Saw-leaf Wormwood*	Artemisia serrata (31)	Aug. 10—Sept. 15
Biennial Wormwood†*	Artemisia biennis (25)	Aug. 10—Oct. 1
Canada Wormwood	Artemisia canadensis (26)	Aug. 15—Oct. 1
23. SORGHUM GROUP—TRIBE ANDROPOGONEÆ		
Blue Stem†*	Andropogon furcatus (19)	July 15—Aug. 15
Indian Grass†	Sorghastrum nutans (160)	July 15—Sept. 10
Broom Beard Grass†*	Andropogon scoparius (20)	July 20—Aug. 20
Sorghum†*	Andropogon sorghum (21)	July 25—Aug. 30
Sudan Grass	Andropogon sorghum var. sudanensis (93)	July 25—Aug. 30
24. RAGWEED GROUP—COMPOSITÆ (AMBROSIACEÆ)		
Western Ragweed†*	Ambrosia psilostachya (13)	July 28—Sept. 1
Giant Ragweed†*	Ambrosia trifida (14)	Aug. 2—Sept. 15
Common Ragweed†*	Ambrosia artemisiifolia (12)	Aug. 5—Oct. 15
False Ragweed†	Franseria acanthicarpa (86)	Aug. 10—Sept. 10
Marsh Elder†*	Iva xanthifolia (96)	Aug. 10—Oct. 1
Beach Clotbur	Xanthium echinatum (172)	Aug. 10—Sept. 10
Cocklebur†	Xanthium canadense (171)	Aug. 15—Sept. 15
Cocklebur†	Xanthium speciosum (173)	Aug. 15—Sept. 20

tinct families, the Cyperaceæ, represented by the sedges and bulrushes, and the Typhaceæ, represented by the cattails.

Scheppergrell,[35, 36] among the early investigators in this country, disregarding the species differences, attempted to make the problem of diagnosis and treatment very simple by classifying the hay fever plants in four groups as follows:

1. Ambrosiaceæ (Ambrosia, Franseria, Iva and Xanthium)
2. Artemisiæ (Sage brush and Wormwood)
3. Gramineæ (All grasses)
4. Chenopodiaceæ (Russian Thistle and Goosefoot, also the Amaranth and Dock families)

He expressed a belief that a pollen extract made from any member of a group would protect against any other member of the same group. While the group relationship is important to recognize, for to a certain extent it simplifies or at least establishes an orderly basis for diagnosis, the attempt at simplification referred to above as proposed by Scheppegrell, grouped together plants which were too widely separated in relationships. In the fourth group of his classification he has included three separate and distinct families. These may be located in our grouping by the numbers 11, 18, and 19.

In our classification we feel that botanical relationships clearly warrant the recognition of each group, with the possible exception of the rank given to subdivisions of the grass family. Our position here is one of caution based upon differences of opinion as stated in the literature. From Cooke and Vanderveer we quote the following: "On the whole we can say that an individual reacting to one grass reacts to all, which

bespeaks a biological entity of the protein derived from the pollens of the gramineæ."

Watson and Kibler deny this and contend that grass cases seen by them in the southwest do not react to timothy or rarely so, and those who do react usually have lived in regions where timothy is grown. From Rackeman we quote: "While Chabot has shown that there is considerable immunologic overlapping between pollens of one grass and another, we believe that the question of a specificity is still an open one. There is much less uniformity in the period of symptoms in the grass sensitive cases than in ragweed cases. These observations indicate, we believe, that different patients are sensitive to different grasses; that one grass is the primary factor in one case and another grass in another."

Believing that the question of specificity among the grasses has not been definitely disposed of, we have taken an intermediate position and have used the botanical subdivisions of the grass family as the basis for grouping. Each grass group is recognized by the botanist as a Tribe and each group includes plants which stand closer in relationship to other members of the same group than to those of other groups. In our classification there are nine of these subdivisions of the grass family designated by the numbers 8, 12, 13, 14, 16, 17, 20, 21, and 23. Should future work demonstrate that the pollens of grasses all contain only one and the same hay fever causing substance, then these groups may all be incorporated into one. This too would make it unnecessary to consider species from the standpoint of diagnosis and treatment. It would seem well for the present to bear in mind the possibility that a hay fever causing principle characteristic of the grass family may be present in all grass pollens but that a species may produce an additional substance peculiar to itself that is capable of causing hay fever.

THE CLINICAL APPLICATION

Clinical study is the only means known at present that will enable us to say whether a given pollen does or does not contain hay fever exciting properties. The positive skin test and the ophthalmic reaction are the most generally recognized measures for determining this point. We had hoped to study by these mechanisms the pollens of all the plants which we have listed. In this we were to a certain extent disappointed, for although orders were placed with the leading pollen exchanges in the United States, many of the pollens could not be had. However, the number of pollen specimens that were obtained was so great that to test each individual for these singly would have consumed so much time as to render the procedure very impractical. Various workers, and particularly Chabot, have demonstrated considerable overlapping of immunological reactions in related species and genera. For this reason, we felt justified in making up mixtures of related species and genera for routine preliminary tests. By this procedure we were able to make a preliminary survey of the sensitivity of the individual patients in regard to the entire list of plants in twenty-four tests. The twenty-four groups are those of corresponding numbers as shown by the list of the hay fever causing plants as set forth in the preceding pages. Those pollens used in each group for skin testing are designated thus (†). The group mixtures contained equal amounts of the pollen so designated in each group.

METHODS OF TESTING

The routine preliminary tests were made by the scratch method. A drop of N/10 sodium hydroxid was placed upon the scratch, to which a liberal amount of the dried pollen was added.

The reactions were classified as 1 plus, 2 plus, 3 plus and 4 plus, respectively, but since little or no correlation exists between the degree of skin reactions and the severity of the clinical symptoms, the data to be presented here make no distinction as to degree of reaction.

Questionable positives were rechecked by intradermal injections of extracts of those pollens in question. Reaction was considered negative when no reaction was obtained to extracts containing .1 mg. of nitrogen per c.c.

The skin tests were routinely applied to 100 cases of hay fever among the students at the University of Minnesota without selection as to severity or the season of symptoms. A positive skin test is generally accepted as proof that the pollen in question is capable of exciting hay fever symptoms. In diagnosing a given case, however, the skin test must be evaluated in terms of the dates of incidence in the atmosphere of the pollen which produced the positive skin test as correlated with the season at which symptoms occur.

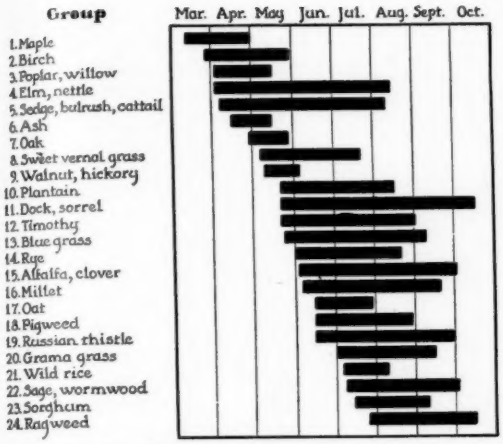

Chart 1. The pollenating periods of the several groups of pollens used in this study.

THE RELATIVE IMPORTANCE OF THE GROUPS

We have attempted to appraise the relative importance of the groups by the process of analysis of the 100 clinical cases of hay fever. In Chart 2 are shown the number of cases showing symptoms for each month from April to October, inclusive. Since the total number of cases used for the study is 100, the number of cases for each month may also be read as %. The percentage incidence of hay fever by months is as follows:

Month	April	May	June	July	Aug.	Sept.	Oct.
Per cent	3	24	49	56	89	85	59

In Chart 2 are also shown the number of positive skin reactions obtained for each group which was producing pollen concomitant with the period of symptoms.

By way of illustration, it will be seen that in three cases symptoms were present in April. Groups 1 to 6 inclusive were shedding pollen during this period, as may be readily visualized by reference to Chart 1. Chart 2 shows the relative importance of the Groups 1 to 6 in relation to these three cases, as follows:

Case 1	+					+
Case 2	+		+	+	+	+
Case 3	+	+	+			+

Group 1 Maple, 2 Birch, 3 Poplar, 4 Elm, 5 Sedges, 6 Ash

This indicates that, given an equal amount of distribution, the Maple and Ash groups are of equal importance. The Cottonwood or Poplar group ranks second while the other three groups rank the same, not more than one reaction being obtained to each.

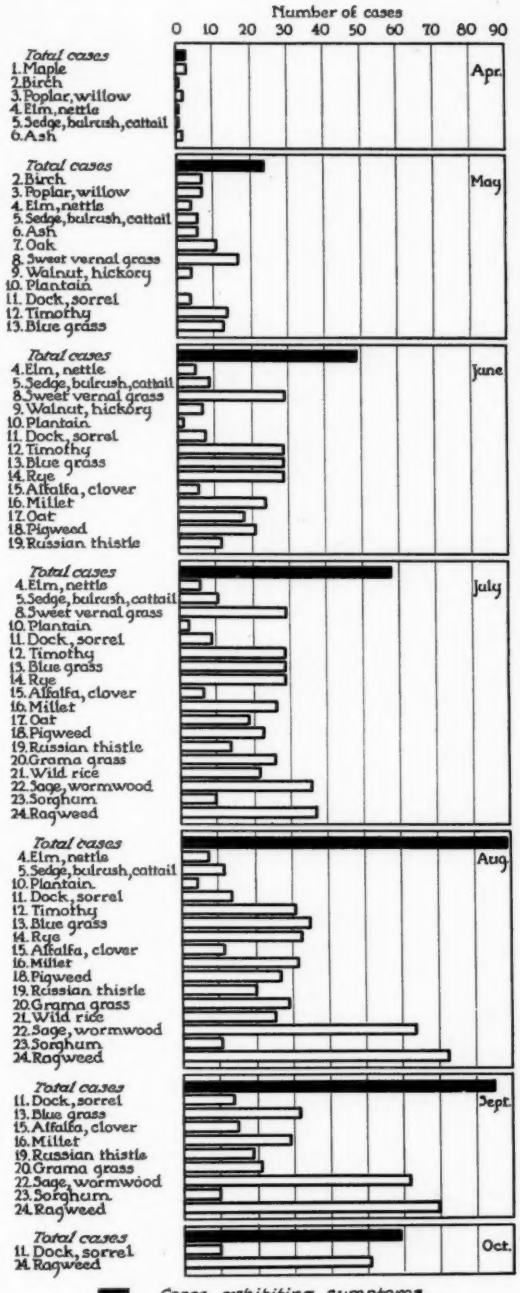

Chart 2. The incidence of symptoms by months in one hundred cases of hay fever and the relative importance in these cases of the various pollens in the atmosphere during the months in which their symptoms occur.

Space forbids a discussion of the cases and causes for each month, but the reader may easily analyze for himself the relative importance of the several groups occurring in each month by a study of Chart 2.

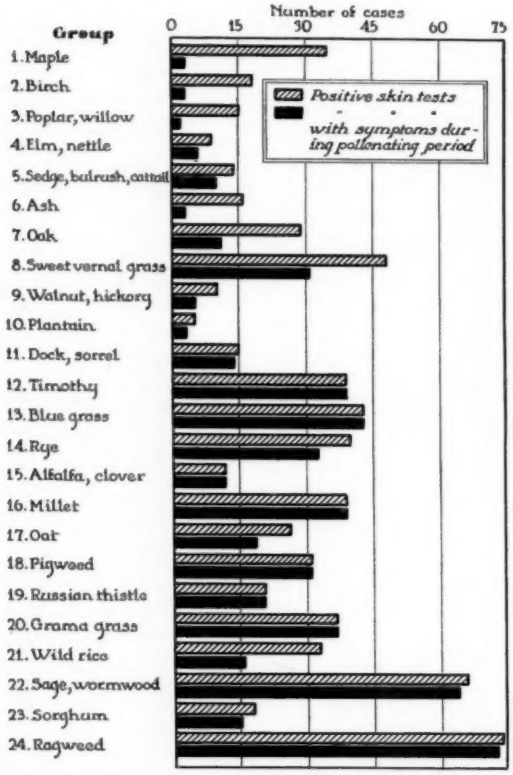

Chart 3. The importance of evaluating the positive skin test in terms of the periods of pollenation and of symptoms is indicated by the lack of correlation between these factors.

Another approach to the evaluation of the importance of the several groups which seems legitimate is a comparison of the total number of positive skin reactions obtained for each group. However, the positive skin reaction becomes significant only when the individual upon whom it is produced has hay fever coincidentally with the flowering period of the plant or group of plants under consideration. For example, a study of Chart 3 shows that although thirty-five individuals (*i.e.*, 35 per cent) gave positive skin reactions to the Maple group, only three of these complain of symptoms corresponding to the period during which pollen is shed by members of this group.

This lack of correlation between the number of positive skin tests and clinical hay fever coincident with seasonal incidence of the pollen is seen to be greatest in those groups which flower earliest. As the season advances correlation increases. Perfect correlation occurs for Groups 11 (Polygonaceæ), 15 (Alfalfa Group), 18 (Amaranthaceæ), 19 (Chenopodiaceæ), 22 (Artemiseæ), and 24 (Ambrosiaceæ).

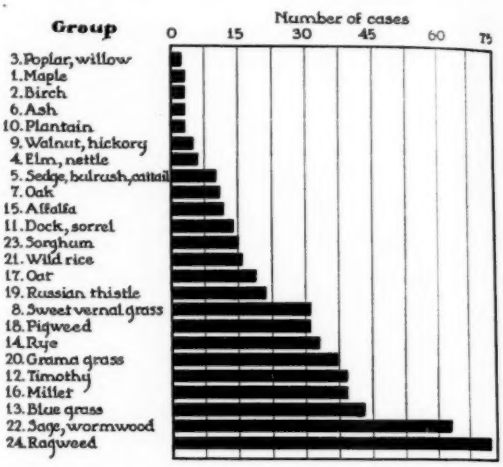

Chart 4. The relative importance as causes of hay fever of the several pollen groups included in this study, based upon the number of cases having symptoms corresponding in time to the pollenating period of the plants to which they give positive skin tests.

The importance of the insect pollenated alfalfa groups as indicated by this study was surprising to us as 10 per cent of those tested gave positive skin tests and also had clinical symptoms corresponding to the pollenating period of the group. While we feel that this needs further investigation, we wish to call attention to the fact that in the past the importance of other groups has been evaluated upon a similar basis.

A somewhat clearer picture of the relative importance of the several groups is shown in Chart 4. This shows the number of the 100 examined who have clinical symptoms during the pollenating periods of the groups to which they give positive skin reactions. Since the total number of cases is constant (100) these may be read as per cent values.

MULTIPLE SENSITIZATION

It is obvious from Chart 4 that a considerable number of individuals must have multiple sensitivity. If we total the cases for all groups we get a total of 533 group cases, but since only 100 pa-

tients are involved this leads to the conclusion that there is an average of 5.33 group sensitivities to each case. This is a point which is often overlooked.

The ragweed group, as one would expect from reports from other parts of the Mississippi Valley, ranks first in importance (Chart 4), being a causative factor in 73 per cent of cases. We wish to emphasize the fact, however, that the ragweed group is not the sole causative factor in these seventy-three cases. As a matter of fact, no more than four of the seventy-three cases (5.5 per cent) were sensitive to the ragweed group alone. We found that of the seventy-three cases sensitive to the ragweed group, fifty-eight (80 per cent) were also sensitive to the wormwood group; eighteen (24.6 per cent) to the pigweed group; thirteen (17.8 per cent) to the Dock group; fifteen (20 per cent) to the Russian Thistle group; and thirty-three (45.2 per cent) sensitive to grass groups which pollenate in the fall period. Since all of the groups involved in the multiple sensitizations are shedding considerable pollen during the fall period, one may well question the time honored opinion often expressed in the advertisements of the manufactures of pollen extracts that the ragweed is responsible for 80 per cent of the cases of fall hay fever. That approximately that per cent of cases are sensitive to ragweed is probably correct, but as we have already shown, it is the sole cause in a relatively small number (5.5 per cent) of cases.

Lest we be misunderstood we hasten to add that we have not intended to create the impression that in our opinion the importance of the ragweeds has been overestimated; rather that the complicating factors mentioned above have been underestimated. We believe that our contention is adequately supported by the fact that we see patients who are sensitive to these complicating groups who are not sensitive to ragweed, yet who have symptoms equally as severe as many of the ragweed sensitive cases during the same period. Since these pollens acting alone are able to produce severe hay fever, it is unreasonable to suppose that where multiple sensitization exists, the patient may be relieved by the administration of ragweed pollen extract alone. Unless multiple sensitization is looked for, not only is the diagnosis incomplete but an unsatisfactory result from treatment is inevitable.

In conclusion may we state that it gives us pleasure to present this material to the medical profession of Minnesota. If it shall serve to place the diagnosis and treatment of the many hay fever sufferers of this state on a more accurate basis, we shall feel that the great amount of time and work entailed has not been in vain.

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ALLERGY IN THE FIELD OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY*

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TO begin with, the title of my paper is to some extent a misnomer, since it is naturally impossible to discuss allergy in any field as a separate entity. Despite all the definitions of allergy that have been made or attempted, I feel like attempting another, which perhaps will not be altogether original and not perhaps any more satisfactory than others already formulated, but which has the merit at least of rendering my own ideas on the subject more clear and definite. Von Pirquet first used the term and defined it as "Reactionsfähigheit," or a changed reaction capacity which an organism gains through recovery from disease, or through treatment with foreign substances. But since of two organisms treated in exactly the same way with exactly the same antigen, one may develop this Reactionsfähigheit in an extreme degree, and the other not at all, since indeed it seems impossible to develop it in whole groups of organisms of certain species, whereas it can be developed with the utmost ease in other groups of the same species, and since furthermore certain species, such as the guinea pig, exhibit this tendency to changed reaction capacity to an extraordinary extent, whereas other species, such as men and rats, exhibit it only in a comparatively limited way, it has always seemed to me that the matter goes deeper than anything involved in Von Pirquet's definition. I have come to look upon allergy as the background, perhaps the inherited, I think at least often the inherited background, the essential constitutional characteristic, which gives to the individual, or even to the species the possibility of becoming sensitized. Or it might be better to say gives such a possibility in an unusual degree for it may be true that all individuals could be sensitized under certain conditions, that is to say by, *e.g.*, enormous doses on top of a resistance reduced in ways that we do not understand.

It is certain then that to talk about allergy in any field, whether ophthalmology, or gastroenterology, or any other, would have a tendency to bring about too restricted a view, to cause us to lose sight of the underlying, basic thing that allergy really is, unless at least we keep our thinking very clear. We can, of course, talk about the phenomena, or series of phenomena, brought about by the operation of allergy in any field. These, I believe, it would be proper to refer to as anaphylactic phenomena, since anaphylaxis might be defined as the series of phenomena resulting from the exposure of a sensitized animal or an allergic animal to the influence of the antigen to which it is sensitive.

I have no intention of discussing further the varying shades of meaning of the terms allergy, or anaphylaxis, but I would like to draw your attention particularly to the well known fact that artificially induced sensitization in animals is highly specific, the animal reacting only to the particular antigen used in the first place, whereas the allergic state in man is usually characterized by multiple sensitiveness, the individual reacting often to many different substances. Desensitization in an artificially sensitized animal is usually definite and easy to bring about, whereas in the allergic state of human beings we are confronted by much more difficult problems in this regard. There are many other differences, but it would not be possible or even germane to my present purpose to discuss them here. I have mentioned these two only to prepare your minds in advance for the conclusion to which everyone who persists in the study of the subject eventually comes, viz., that the *specific* diagnosis and treatment of the allergic state present problems that are by no means easy, and that, in spite of all that has been accomplished, there is an unexplored ocean of knowledge before us.

Which brings me first to the general problem of the diagnosis of the allergic state. A patient may complain of attacks of sneezing and watery discharge of such a character that one may well question whether the slight and occasional im-

*Read before the Minnesota Academy of Ophthalmology and Oto-Laryngology, December 9, 1932.

pact of a nearly normal middle turbinate upon a somewhat deflected septum can have any causative relationship to the symptoms. Or another comes to be refracted on account of headaches for which others have not been able to find any cause, but he has perhaps orthophoria and emmetropia or at most one-half diopter of hyperopia or two or three degrees of exophoria. The thinking man turns often to the consideration of the possibility of an allergic vasomotor rhinitis, or an allergic migraine, or an allergic this, that, or the other as the case may be. Through what processes must his mind travel before the possibility becomes to him a probability?

I should say that he must consider first the essential underlying phenomena of all allergy and ask himself whether the symptoms he is observing are consistent with these phenomena. After all there seems to be only two of them and on those two all the varied manifestations of allergy in all or any part of the body are based. The first of the two is increased irritability and spasm of smooth muscle tissue. The second is increased capillary permeability. Asthma can readily be explained on the basis of the first; vasomotor rhinitis and migraine just as readily on the basis of the second. The point is that if the symptoms under consideration can not be explained on the basis of either or both phenomena they are almost surely not of allergic origin.

But the mere ability to explain the symptoms on such a basis would certainly not be conclusive proof that they were of allergic origin. One should go much further. He should search for other manifestations of allergy. It would be very confirmative of the allergic character of attacks of rhinitis to find that the patient was also subject to urticaria, or eczema or asthma, or any other disease of known allergic origin.

In addition one must inquire closely into the family history for it has been abundantly proven that allergy runs in families. I think it is rare to find a true case of allergy where this family relationship cannot be shown in a greater or lesser degree. It is not alone in the interests of diagnosis that this relationship should be traced as far as possible in every individual case, but also in order that our general knowledge of the subject may be increased through this contribution to exact observation and classification.

Skin reactions, when they can be obtained, are, of course, almost positive proof of the existence of an allergic state. I have now reference only to the diagnosis of allergy and not to the question of a determination of the particular antigen or antigens to which the individual may be sensitized, of which I will speak in particular shortly. Van Leeuwen and his co-workers in Holland have shown that there is one antigen to which practically all allergic individuals give positive skin reactions, and to which on the other hand almost all non-allergic subjects give negative reactions. Curiously enough this substance is human dandruff. If this observation is confirmed it should prove of value in the determination of the existence of the allergic state, at least so far as the simplification of the skin tests are concerned. Lastly, one must determine the presence or absence of a blood eosinophilia. Nothing is better proven than that the vast majority of allergic individuals exhibit this phenomenon. But it should be remembered that it is to be found as a rule, at least in any very noticeable degree, only during active manifestations. It is not only in the blood that large numbers of eosinophiles are to be found. They exist in smears taken from discharges from the affected tissues, as for instance the conjunctiva, the nasal, pharyngeal, and bronchial mucous membranes, and also in the tissues themselves. It should be remembered, however, that this is not a constant phenomenon—that in fact, as Kahn and Stout have lately shown, the eosinophiles may disappear entirely or nearly entirely from the nasal discharges during extremely violent allergic rhinitis and also during periods of intercurrent bacterial infections.

In recapitulation then, one diagnoses the state of allergy without reference to the particular antigen producing the symptoms by: (1) the existence of symptoms that could possibly arise from increased smooth muscle iritability or increased capillary permeability or both; (2) the presence of other manifestations of allergy; (3) a family history of allergy; (4) a blood eosinophilia or the presence of eosinophiles in the discharges from the infected tissues or in the tissues themselves; and (5) positive skin tests.

There has been a tendency of late to discount the value of skin tests so far as a determination of the specific antigen causing the symptoms is concerned. The common occurrence of multiple sensitization and, as Barber has pointed out, the

absence of antibodies from the skin altogether though they may be present in other organs, or their presence in one skin area though not in another, are circumstances that sometimes make such a determination by those tests difficult or impossible. This is particularly true in the case of food allergy. Here one is often driven to food elimination tests to determine the trouble-causing substance. In cases of sensitization to air-borne substances, such as pollens and animal emanations, the determination by means of skin tests is often easier. But the whole subject of the diagnosis of specific antigens is full of such complexities that, as has been said, it requires the instincts of a detective to follow it out in many cases. One must neglect no clues offered by the history of the case, by the occupation, the mode of life, the place of residence, a change of residence, the time of attacks, whether referring to the time of day or the time of year. How else can one determine the cause of the attacks in a case sensitized to the shell of eggs and yet able to eat the contents of the eggshell with impunity—for such a case has been reported. Cases are known sensitive to the meat of hens but not of roosters. Rowe reports a case sensitive to roasted, salted peanuts but not to roasted unsalted peanuts, nor to salted, unroasted peanuts. It would be interesting, if one had the time, to enter more fully into this phase of the subject.

In the field of Ophthalmology and Oto-laryngology, there are many diseases, the symptoms of which lend themselves to explanation on the basis of increased smooth muscle irritability or of increased capillary permeability, or of both. The allergic nature of perhaps a majority of these diseases has indeed been proven. Others, undoubtedly, will be proven. Rowe contends that "allergy is probably, next to infection, the most common and important etiological agent in human symptomatology." So far as the eye is concerned Mills and Martyn, in a recent article, mention recurrent conjunctivitis, scleritis, chronic and some acute uveitis, presenile cataract, vitreous opacities and degeneration, retinal edemas, degenerations and recurrent hemorrhages, sympathetic ophthalmitis, retrobulbar neuritis, retinal detachment and exudative glaucomas as conditions where one must often take into consideration the possibility of an allergic basis. Certainly they might all be due to an altered chemistry of the eye fluids and this altered chemistry can be easily explained by increased capillary permeability, allowing transudation of colloids into the fluids and tissues of the eye, whereas in health these fluids and tissues are almost free from colloids. The presence of split protein products such as urea, amino acids, creatine, etc., in the eye fluids has been chemically demonstrated in many if not all of these conditions by Duke-Elder, Magitot, and others.

In the domain of oto-laryngology, we have perhaps been quicker to recognize the possible allergic background of many pathological conditions, because, of course, they are on the whole more evident. The manifest influence of pollens in the production of symptoms rather loosely grouped under the term hay fever, an influence recognized now for many decades, has stimulated the search for other possible antigens, for other pathological conditions which might be explained on a hitherto unrecognized allergic basis. The search has been a successful one. We know now that almost innumerable substances may be responsible for acute rhinitis, chronic rhinitis, seasonal rhinitis, perennial rhinitis, sinusitis, pharyngitis, laryngitis. I am using these terms merely in accord with custom, well aware as I am that they connote inflammation and that the pathology of inflammation is altogether distinct from that of allergic reactions. I wish that I could enter into the subject more fully but time forbids. However, we ascribe true inflammations to the action of bacteria and bacteria must grow and develop in the tissues before the inflammation can ensue, a process requiring time. On the contrary the reaction to the presence of an antigen is seldom delayed and can develop almost with the rapidity of—I had nearly said lightning. I once sat at dinner with a certain lady who appeared to be in perfect health. Before the dessert course, she complained of sudden numbness and swelling in her lips, her tongue, her throat. Her respiration became embarrassed and for a time, I was alarmed. The throat and even the mouth were edematous. The uvula was nearly the size of a hazel nut but the symptoms subsided quickly under the influence of ice and adrenalin. She had had a few milder attacks of the same kind within the previous year or two, and had noticed that they always came on after eating salads. But often, too, she ate salads with impunity. Recollection and investigation developed the fact that she was sensitized only to a certain salad

dressing in which cottonseed oil instead of olive oil was used. She was, however, highly allergic, with a clear history of asthma, hay fever, prurigo and skin eruptions. Amongst her near relatives, there were several distinctly allergic histories to be obtained.

I have perhaps erred in taking any of the little time at my disposal to refer to an acute case at all. I did it merely to illustrate my point. But the allergic character of the acute cases is usually easily enough recognized, the proper measures are taken and the attack subsides. It is the more chronic cases that put us on our mettle, the perennial forms, *e.g.*, of rhinitis, sinusitis, perhaps otitis, that in the past have suffered many things of many doctors, too often to have been benefited little by any. It is shocking to think of the operations that have been performed on noses of little allergic children in the name of "sinus trouble" not to speak at all of the adult septums that have been straightened to a more or less architectural correctness, the repeated ethmoidectomies, the futile antrum punctures, window resections, and finally radical operations, many of which might have been dispensed with if a proper consideration had been given to the possibility of an allergy that rendered all such efforts nearly useless.

Of course, I am not to be understood as engaging in any wholesale condemnation of nasal surgery. I am only insisting that the possibility of allergy should always be borne in mind. I am even quite willing to admit that there are cases in which there might never have been any allergic manifestations if it had not been for pre-existing pathology that might have required surgical intervention for its cure. But I wonder if the reverse is not almost equally often the case, if hypertrophic rhinitis, posterior tip enlargement, polyposis, sinusitis, are not the result of long continued allergic manifestations which must be overcome before one can hope for a permanent cure. Hay fever, asthma, perennial rhinitis and so on are perhaps sometimes benefited, though almost certainly never cured by the straightening of a deflected septum, the removal of polypoid masses, the drainage of infected sinuses. On the other hand they are sometimes even made worse by any surgical interference. I suspect that the often unsuspected allergic basis for much nasal pathology is not infrequently the cause for the failure of much nasal surgery and consequently for the degree of discredit into which nasal surgery has fallen in these latter days.

I am not unmindful of the very frequent presence of a bacterial allergy. Naturally in such cases, one can hardly expect to cure the allergic manifestations until the bacterial foci are properly dealt with. Such bacterial sensitization often co-exists with other forms of protein sensitization. One may be engrafted upon the other and it may often be difficult to determine which is the primary form. Both must be treated, perhaps surgically, perhaps specifically, perhaps both. But the cure of either nearly always renders the management of the other less difficult.

It would not be possible now to enter in any detailed way into an account of the various ophthalmological and oto-laryngological conditions which might be, perhaps are, due to allergy. Our field of view in this regard is constantly enlarging. My own attention lately has been directed to the ear. I never examine an ear case now without a careful inquiry into the personal and family history from the standpoint of allergy and I hope that some day it will lead me to more definite opinions on the point. But why could not many of the acute exudative, recurring forms of mild so-called middle ear catarrh be nothing but the allergic transudation of fluids loaded with colloids, amino acids, urea, uric acid, creatine, through abnormally permeable capillaries? Why not indeed since the middle ear is nothing but a nasal sinus devoted to a special purpose and since we know that this is a very common, a very well known pathology in all these cavities? Why could not this result in a chronic condition of the mucous membrane analogous to what we find in the nose and sinuses, with a consequent progressive deafness? Why could not injury to the auditory nerve itself result from a similar transudation into the labyrinthine spaces? At least we know that migraine can certainly be sometimes explained on the supposition of such pathology and that the labyrinthine spaces are continuous with the spaces of the pia mater. I wonder if the ear is not a much more fruitful field for an application of all the before mentioned tests for allergy than we have hitherto imagined.

In England, Barber and Oriel have lately been doing some very interesting work. They have isolated from the urine of allergic individuals a

proteose-like substance which they believe to contain the specific antigen causing the manifestations or possibly secondary antigens or both. It is not possible now to do more than merely refer to this theory of secondary antigens. The experiments of Manwaring and others have done much to make it seem plausible. Secondary antigens are supposed to be produced mainly by the liver from the original antigen. Their presence—if they are present—may account for the frequent failure of attempts at desensitization by the original antigen. Barber and Oriel seem to have shown that the quantity of proteose in the urine is greatly increased during allergic attacks. They claim that allergic individuals very commonly give skin reactions to their own proteose and that normal individuals will become sensitized to this same proteose and will give skin reactions to it if they are injected with serum from the allergic individual from whom the proteose was obtained. Barber states that urinary proteose is not only specific but incredibly and inconveniently so and that it is capable of producing acute exacerbations of a given patient's symptoms in a dose of .1 c.c. of a one in one million dilution. Oriel states that "in specific food sensitization it has been possible to sensitize guinea pigs actively to the foods to which the patient was sensitized, using the urinary nitrogenous substance as the sensitizing agent." I can unfortunately not enter here into the details of the work done by these men and can only refer you for the present to their original articles.

I have, however, with my partner, Dr. J. S. Macnie, made some attempt to confirm the results of their experiments, though we commenced the work too late in the hay fever season of the present year to allow of our drawing any certain conclusions. Following meticulously the latest method outlined by Dr. Oriel, we obtained proteose from the urine of seventeen patients. Fifteen were cases of ragweed hay fever, one of urticaria. This latter case I had been treating for colds in the head. Several of these patients were confirmed asthmatics; one of them had developed asthma for the first time this season. In all the proteose was obtained during active allergic manifestations.

There was no difficulty about obtaining the proteose. In every case a substance was obtained giving the physical and chemical characteristics of the substance obtained by Oriel. But in not one case did we obtain a skin reaction that could fairly be called positive in the light of the control test. We did obtain erythemathous skin reactions in many cases but never a definite wheal, much less a wheal with pseudopods. This was true whether the test was made by the scratch method or intradermally and in every case both methods were tried. The results of the conjunctival test and of intra-nasal sprays were equally negative. In spite of these negative findings I used the substance therapeutically in seven cases. Far from noticing any such acute exacerbations of the patient's symptoms as mentioned by Barber even though the proteose is administered in such infinitesmal doses as .1 c.c. of one in a million dilution, I found not the least exacerbation even in doses of .3 c.c. of one in a thousand dilution.

There did appear to be some amelioration of the symptoms in several of the seven cases in which the substance was used therapeutically, a circumstance encouraging perhaps as far as it goes, but without broad enough empirical basis to be of any demonstrative value.

There have been other reports of failure to confirm the results of Barber and Oriel, though one can not deny the validity of their experiments, and indeed others have confirmed them in greater or lesser degree. The results they have obtained with Dale's test alone would almost seem conclusive. After sensitizing a guinea pig with the serum of an allergic patient, they suspend one horn of the animal's extirpated uterus in Ringer's solution. The addition of the same patient's proteose to the solution produces more or less violent contractions of the smooth muscle or the organ, which contractions can be recorded on a suitable apparatus. The contractions cease after all the antigen has combined with the antibodies in the uterine tissue. The fact that the contractions can be renewed by the addition of histamine to the solution shows that this cessation is not the result merely of exhaustion.

They have shown, furthermore, that if any particular skin area of a normal individual be passively sensitized by the injection of the serum of an allergic individual, this skin area will give positive reactions to the proteose of the patient, corresponding to the well known Prausnitz-Künstner reaction. Many other experiments, which cannot be here detailed, point to the specificity of proteose.

One wonders if the varying threshold of elimination of the kidney may not be responsible, to some extent, for the different results obtained by different observers. It is well known, of course, that this threshold of elimination does vary greatly even for the same substance in the case of different individuals and why not for proteose? Still it seems almost incredible that this fact could possibly explain the uniformly negative results in seventeen consecutive cases. It seems almost equally incredible that other observers should obtain positive results in such an extremely large percentage of their cases. I can only state that so far we, ourselves, have been unable to obtain the least proof of the specificity of proteose.

Naturally the proteose reaches the kidney through the blood and consequently it must be found in the blood. I don't know whether anyone has even looked for it there. I don't think, indeed, that a great deal is known about the exact composition of this proteose. It seems to be a product of protein cleavage or digestion, whether this cleavage takes place in the blood itself or the liver or other tissues. Professor Melli of the University of Rome has recently observed the presence of proteolytic ferment in the blood of asthmatic patients. Such considerations might suggest the possibility of using injections of autogenous blood serum or even whole blood as a therapeutic agent in certain allergic diseases. I know of no one having tried or even suggested it. Some encouragement of the idea might be found, however, in the fact that this very method is commonly resorted to now in the treatment of sympathetic ophthalmia, quite empirically but, as we all know, with distinct success, and there is more than a suspicion that sympathetic ophthalmia is itself, sometimes at least, an allergic manifestation. I hope to have something to say along these lines before another season rolls by.

I can only allude to the question of physical allergy. There is no longer doubt that there is such a thing as a changed Reactionsfähigheit to the action of such physical agents as heat, cold, light, etc., and we must not fail to relate this form of reaction capacity to pathological conditions in our field in cases where it really exists. We all know cases in which sneezing and other manifestations of an allergic form of rhinitis, of conjunctival irritation (perhaps I should here suggest vernal catarrh, so-called), of asthma, are produced by exposure to cold or light or heat. I will not mention urticaria, erythema, etc., since they are outside our field—except to illustrate my point. I know a woman who can not get out of bed in a cold room without the production of an immediate attack of asthma. Quite recently, I treated a young man, a very intelligent Filipino, for hay fever, who has always been unable to bathe in cold water without the breaking out of an urticarial rash. His mother was similarly afflicted. I am quite convinced that nearly all these cases are allergic from a much wider standpoint than the purely physical. Of the two I have mentioned—and I could mention many others—the former is sensitized to a wide variety of substances, including pollens, the latter is sensitized to pollens, at least, and probably to emanations of various kinds, of foods or both, though there has not yet been opportunity for making other tests.

SUMMARY

I have endeavored to clarify our idea of allergy by making of it a basic, probably inherited peculiarity of constitution which gives to the individual a greater than normal capability of sensitization.

I have drawn attention to certain differences between allergic phenomena in animals and in man which render their study in the latter more complicated and more difficult.

The problem of the diagnosis of the allergic state without reference to the particular antigen causing the manifestations has been discussed, it having been shown to rest upon: (1) a recognition and appreciation of the two underlying phenomena; (2) other manifestations of allergy; (3) a family history of allergy; (4) eosinophillia; (5) positive skin tests to one or some or many antigens.

The question of the uncertainty of specific diagnosis as opposed to the general diagnosis of a state of allergy by means of skin tests has been taken up and the difficulties of specific diagnosis by any method alluded to.

I have emphasized the certainty that many of the pathological conditions seen in the field of ophthalmology and oto-laryngology have an allergic basis and the probability that many more will ultimately be found to depend upon it and have suggested diseases which may, at present, be found in both categories.

I have dwelt at some length upon the consequent necessity of weighing well the question of allergy before resorting to surgery that all too often will be at least futile, perhaps injurious, without such a consideration of the pros and cons of the matter.

Bacterial allergy and the necessary lines of attack against it has been referred to.

The work of Barber and Oriel with urinary proteose has been very shortly dealt with and certain experiments of our own, made in an attempt to confirm their results, described. Some attempt—unsatisfactory it is true—has been made to account for the discrepancies in the results of different observers. It has been suggested that there may be some basis, both theoretical and experimental, for the use of autogenous blood injections in certain states of allergy.

Lastly, it has been shown that one should not overlook the possibility of physical allergy.

LOW BASAL METABOLIC RATES—A CLINICAL STUDY OF STATES OF LOWERED BASAL METABOLISM FOUND IN CONDITIONS OTHER THAN MYXEDEMA*

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SINCE one of us[8] studied a series of cases of low basal metabolism in 1928 there have appeared numerous reports in the literature concerning a wide variety of conditions with which a low basal metabolic rate has been associated. Some of these conditions we have recognized, while others we have not encountered. Therefore, we considered that a further study should be made of an additional number of cases. The first series comprised 510 cases occurring in the first 2,500 basal metabolic rate determinations done under the direction of the senior author. All but a few hundred of those determinations were done personally by the associate author. We have now completed over 5,000 tests, making an additional 2,500 available for comparative study. All of the tests in the second group have been done by one of us (B) personally. The first study concerned itself largely with an attempt to pick out what might be assumed to be a characteristic or typical symptom-complex. In our second study we largely confirmed these findings and added some other data. A good many of these tests were only single tests. All were done on ambulatory patients. Only such tests as were considered from our experience to be satisfactory, or which were checked by one or more repetitions, are included in the subsequent discussion. Some of the determinations made during the menstrual period are included because we are inclined to agree with those who think that the only factor during menstruation which is likely to affect the basal rate is that of pain,[13, 16, 32] and this would tend to elevate rather than decrease the rate.

No particular attention was paid to supposed premenstrual rise as noted by Benedict and Finn,[4] and McClendon.[25] On many of the patients numerous tests were made at greater or lesser intervals. These tests were always consistent with each other or with the therapeutic measures employed. We have persisted in using ± 10 as the limits of normal variation because that seems to be universal custom and we have found no good data upon which to base a change. DuBois[10] has reviewed the most recent studies in basal metabolism and advised adherence to the original criteria and conditions, and to these we have also adhered. The original Sage standards have more recently been confirmed and upheld by Booth and Sandiford[6] as being quite applicable to first tests done on ambulatory patients.

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To review in part the data derived from a study of the first 2,500 cases,[8] as a means of comparison with the second series, 510 were diagnosed as hypothyroidism and a symptom-complex was found in these 510 cases about as follows: Fatigue, weakness and drowsiness, goiter (28 per cent of these 510 cases), generalized pains and joint pains, constipation, overweight, nervousness (usually of depressive, apprehensive type), menstrual disturbances, sterility and frequent miscarriages. Such physical findings as anemia, low blood pressure and slow pulse were so variable as to be inconclusive.

Nothing but general impressions could be given of the results of therapy in this first series because of poor follow-up, the relatively large number of referred patients and the inclination of the clinician in charge to discontinue the therapy too soon if prompt results were not forthcoming. However, the impression was, that of those taking thyroid in adequate doses and for a considerable length of time, the majority were benefited, especially those who were overweight or those who had menstrual disturbances. There were a considerable number of patients who were not relieved of symptoms in spite of having the basal metabolic rate brought up to normal, and a less number who could not take enough thyroid to influence the basal metabolic rate without experiencing untoward symptoms; and finally, there were some individuals in whom the rate never could be brought to normal in spite of large doses of thyroid substance (6-10 gr. daily) and who showed neither relief of symptoms nor thyroid effect. For these various reasons, therefore, this study of individuals with basal metabolic rates of —10 or lower occurring in the second 2,500 consecutive determinations was made, with reference to the dominant symptoms, for purposes of classification of types if possible, the recognition of any unusual conditions, and to determine the effect of thyroid therapy.

In this second series, 489 cases were separated for study. These were all cases showing a basal metabolic rate of —10 or under in 2,500 consecutive cases. Patients diagnosed myxedema were not included. Therefore, these 498 cases may well be added to, or compared with, the 510 of the original report. After a careful analysis of these data we see no deviation from the symptom-complex previously noted (Table I). The outstanding complaint again is fatigue, weakness or drowsiness, then followed "generalized aches and pains," nervousness, stomach trouble and constipation, overweight, and menstrual difficulties.

TABLE I. SYMPTOM COMPLEX

1008 Cases

Fatigue
Weakness
Drowsiness
Generalized Pains
Joint Pains
Constipation
Nervousness (depression, apprehension)
Menstrual Disturbances
Sterility
Frequent Miscarriages
Overweight
Dry Skin
Falling out of Hair (occasional)

Various diagnoses were found assigned to these patients, usually in addition to that of a state of lowered metabolism, and these were tabulated. In most cases "hypothyroidism" was decided upon as the final, major condition by the clinician in charge, but in a good many it was considered to be the secondary condition. Table II shows the occurrence of associated diagnoses. No attempt was made in this study at correlation. If "hypothyroidism" occurred as a diagnosis at all, it was included for statistical reasons.

Most of the authors who have written on the subject of low basal metabolism have assumed or actually called the condition hypothyroidism. We had begun to suspect that there might be some other cause of the low metabolic rates in at least a certain group of these patients. This assumption may be borne out when we consider the large number of cases found to have some infection. Undoubtedly even a larger number of the total series likewise had something such as tonsillitis or cervicitis which did not find its way to the final diagnosis. At any rate, it becomes necessary to inquire into the influence of infection or metabolism. The large number of cases of menopause also raises the question as to what affects the basal metabolism during the climacteric. If, as many insist, there is no effect on the metabolism by any gland other than the thyroid, then there must be an associated thyroid effect at the menopause. These matters will be discussed more fully in considering the effect of thyroid therapy.

Boothby and Sandiford[7] and Means[28] have concluded that a rate of —10 or lower is a strong presumption of a hypothyroid function if other

glandular deficiencies and starvation states are ruled out.

The metabolic effect of various foods is well known, especially protein, and it is certain that some cases of low basal metabolic rates can be explained on the basis of insufficient or imperfectly balanced food intake. Perhaps the stimulating effects of certain vitamins should be considered, if not in respect to a direct effect on metabolism, at least with reference to indirect metabolic and growth influence.

TABLE II. ASSOCIATED DIAGNOSES
498 Cases

Infections: tonsillitis, sinusitis, prostatitis, cervicitis, bronchitis, pyelitis, etc. (usually multiple in any single case)	84
Menopause (either climacteric or postoperative)	80
Goiter (adenoma, non-toxic and colloid)	43
Obesity	42
Migraine	33
Psychoneurosis (usually anxiety type)	28
Post-thyroidectomy (not showing myxedema)	24
Chronic arthritis (probably in most cases not infectious)	24
Secondary anemia	23
Cholecystitis	18
Hypertension	15
Cardiac	14
Peptic ulcer	10
Glandular dystrophies	13
Urticaria and other skin lesions except acne	11
Lues	8
Fibroids	8
Colitis	6
Pregnancy	5
Achlorhydria	5
Rectal polyps, ulcers or hemorrhoids	5
Cystic ovary	4
Diabetes mellitus	3
Bronchial asthma	2
Salpingitis	2
Kidney stone	2
Pulmonary tuberculosis	2
Epilepsy	2
Encephalitis	1
Spina bifida	1
Glycosuria	1
Raynaud's disease	1

The total number of these diagnoses is 531. The discrepancy between that number and the number in our series (498) lies in the fact that on the one hand a good many diagnoses were multiple and on the other many cases had the single diagnosis of hypothydroidism.

A considerable proportion of our cases were described as undernourished, malnourished and underweight, and these patients were scattered throughout the whole series. Where thyroid substance was prescribed it very frequently stimulated appetite and seemed to help in bringing about a gain in weight.

Higgins,[15] Warfield,[40] Gordon,[12] Youmans and Rivens[42] have all reported series of cases with symptom-complexes quite similar to those reported here. Thommen,[37] McLester,[26] Lawrence[19] and Blumgarten[5] present patients with low basal metabolic rates without myxedema, but with symptoms comparable with all other groups reported, particularly from the nutritional standpoint. Cases reported by King,[17] Ohler and Ullian,[30] Barach and Draper,[1] Sturgis[36] and Dowden[9] have been referred to in our earlier paper.

Lee[22] reported cases of vasomotor rhinitis with low basal metabolic rates improved by thyroid medication. We have not had experience with this specific phenomena and could find no data bearing on it in this group of cases.

Koehler[18] reported cases called hyposuprarenalism and distinguished them from hypothyroidism, but we have not seen any cases we could definitely call such after hearing him deliver his paper. We have, however, occasionally found low rates in Addison's disease.

Constipation was one of the symptoms in our series but it is such a very common complaint in the general run of clinic patients that its importance is hard to evaluate.

Congenital hypothyroidism with achylia gastrica, chronic diarrhea, anemia of high color index and stomatitis described by Barker[2] has not been met with in our series although the occurrence of achylia and anemia separately or together was not at all unusual, and among true cases of myxedema one often meets cases closely simulating pernicious anemia.

Decreased function of the thyroid may show itself through mental symptoms and signs which obscure the actual cause of the disease. Rather marked anxiety and depressive states are frequent, but we have not seen cases as reported by Hayward and Woods[14] whose patients seem to have really had real myxedema. Most of these conditions were diagnosed by the clinician in charge as psychoneurosis, as noted in Table 2.

Familial hypothyroidism has been reported by Shelton,[34] but our records, although not accurately complete in this regard, do not show any such tendency and particularly not the relation to allergy which he mentions.

A particularly critical study is that of Thompson and Thompson[38] with reference to the effectiveness of thyroid medication. Their conclusions were that lowered basal metabolism without myxedema may result in: (1) those who are apparently healthy and normally have a low basal metabolic rate; (2) those with hypothyroidism

too mild to result in myxedema; and (3) those in whom a low metabolism is associated with pathological conditions other than under-function of the thyroid gland. They also recognize states of transient hypothyroidism and states secondary to nutritional, infectious and other factors.

TABLE III. NUMERICAL DATA—PRESENT SERIES

498 Cases

	Married	Single	Total
Male	59	25	84
Female	255	157	412
Total	316	182	498
Total cases on thyroid medication			176
No follow-up			63
Net			113
Improved			71
Not improved			42
Sterility cases on thyroid medication			29
No follow-up			11
Net			18
Failures			11
Successes			7
Threatened abortion on thyroid medication			5
Successful pregnancies			4

Combined Series

Sterility cases on thyroid medication	70
Failures	46
Successes	24

Of our series of 498 patients, 176 received thyroid medication. In sixty-three of these there were no notes as to the effect of treatment, or the period of treatment was too short. Therefore, a summary of results must be confined to 113 cases. Of these seventy-one were improved and forty-two were not improved (Table III). The average dosage was 1 to 3 gr. of desiccated thyroid substance daily, and the duration of treatment varied from two months to four years. In the patients treated over the longer periods of time the therapy was often intermittent. In some improvement was noted following the removal of certain supposed foci of infection during the administration of thyroid. To what the improvement was due, therefore, must remain uncertain. Also, some patients with low rates, to whom no thyroid was given, improved and the rates returned to normal after removal of infections. In many instances the improvement was concomitant with an elevation to normal of the rate, and symptoms returned and the rate fell in these same individuals when therapy was discontinued. It must be said also that improvement was noted in some in whom the rate was not influenced, and conversely there were those in whom it was possible to raise the rate without favorably affecting the complaint. These various analyses were made in individual cases but are not subject to simple charting. In general, as a comment upon previously quoted critics, our impression is that when and if the basal metabolic rate is raised and kept elevated to normal, improvement may be expected. However, enough thyroid must be administered continuously to maintain the level of metabolism at normal. Perhaps the most striking benefits were obtained in the cases of abnormal menstruation and the most discouraging in the cases of obesity.

In this connection Wilder[41] remarks that with diminished thyroid activity obesity might be expected since the rate of expenditure of energy is appreciably reduced in this condition. However, although increased weight is frequently seen in myxedema it is not obligatory and when it occurs it is largely due to accumulation of albuminous fluid and true fat is not much in evidence. In the absence of other unmistakable evidence of myxedema a rate higher than —20 does not justify the conclusion that the thyroid function is other than normal. If the energy metabolism of the obese subject is calculated with due regard to probable mass of muscle or active protoplasm it is seen to be elevated. The observations of Strang and Evans[35] have some bearing upon this point also. In one outstanding case of obesity, the patient did not lose a pound, nor was her basal metabolic rate elevated a single point on as much as 10 gr. of desiccated thyroid daily, although she was one of the sterility patients who became pregnant. Such paradoxical results are hard to explain and even lead to a certain skepticism concerning the whole matter.

The study of the sterility cases was especially interesting (Table III). Twenty-nine females were studied particularly with reference to the possible thyroid effect, that is, were found to have low basal metabolic rates, no other cause for sterility and with whom the male partner was potentially fertile. Results which we assume to be due to the thyroid substance, *i.e.*, pregnancy resulting at an interval after institution of therapy which seemed consistent, occurred in seven cases. Eleven patients had no adequate follow-up. In eleven cases, no pregnancies resulted during what seemed to be an adequate period of time and in two cases the outcome is still in doubt. These results are in addition to those previously re-

ported by Litzenberg and Carey[23] of fifty-two sterile patients with low basal metabolic rate treated with thyroid, one-third of which became pregnant. By adding cases from the present series, twenty-four pregnancies resulted in seventy cases.

In addition, five patients with threatened abortion or in whom abortions had occurred in previous pregnancies, and in whom low rates were found, received thyroid extract and four successful pregnancies resulted. All of these cases are included in the total previously given as improved. The only comparable results are those reported by Ehinger,[11] in whose cases, however, no basal metabolic rate determinations were done. Lacking effective ovarian therapy for sterility, at least these results are in line with suggestions of Rowe[33] that sterility is highest in those showing ovarian disorders, next highest in thyroid deficiency and lowest in pituitary, but that in a non-endocrine group of patients, infertility is definitely less frequent. Meaker,[27] reporting from the Evans Memorial, found that 80 per cent of sterile women had some sort of endocrine dysfunction.

In our previous study we noted especially 137 women, seventy-eight of whom were married, and 56 per cent of the latter sterile. Our present series reveals a percentage of 47.9 of sterility in 255 married females (Table IV). In addition, 1.8 per cent of this number had abnormal pregnancies which resulted in miscarriages, abortions or stillbirths, so that the percentage of actual sterility would be 49.7 per cent, which is considerably greater than that of sterility in the general white female population of the United States (13 per cent).[24]

TABLE IV. NUMERICAL DATA—STERILITY AND MENSTRUAL DISTURBANCES

	Cases	Sterile Per Cent.	Menst. Disturb.
Present series (married females)	255	49.7	
Combined series		52.8	
Present series (menopause excluded)	332		33.5
Combined series			39.7

In our previous series 44 per cent of the total number of females had menstrual difficulties of some order, amenorrhea, menorrhagia, or metrorrhagia. In our present series of 412 females these abnormalities were noted in 28.6 per cent (Table IV). The rather wide discrepancy in this figure is unexplained except that the total number is larger and perhaps many cases are included in which no specific data concerning menstruation was noted, which cases should have been more carefully excluded. Also, the cases of menopause should be discarded from this series. A revision of these figures gives 118 abnormal cases in 332 women, or 35.5 per cent, an average of the two series of 39.7 per cent in 469 cases.

Toronczyk[39] discusses menstrual disorders from the standpoint of thyroid dysfunction and claimed excellent results in twelve treated cases. E. Novak[29] thinks that the most common causes of amenorrhea are ovarian, pituitary and thyroid in the order named, but recognizes that effective therapy can only be had through the use of thyroid extract. Lawrence[20] is inclined to place major emphasis upon anterior pituitary deficiency and claims results with 20 to 60 grs. of anterior pituitary substance. He also ascribes some importance to focal infections and protein deficiencies in the diet. Our own results have been more in accord with those of Novak, in that we have been disappointed in the use of ovarian or pituitary extracts but have found thyroid substance effective in certain cases.

Lawrence and Rowe[21] call attention to occasional cases of migraine which are really hypothyroid. In our series we think that there is more than an occasional case. Headache was a very common symptom and in thirty-three instances was diagnosed as definite migraine. Some of these patients derived benefit from thyroid therapy, although the most of them received none. Here again the clinicians seemed to fear giving thyroid in such a condition in spite of the indication of a low rate.

A few patients had symptoms of urinary frequency as Beck[3] has reported and these also were benefited by thyroid therapy. In fact, the urological department is now routinely requesting a basal metabolic rate in cases of frequency not explicable upon organic grounds.

Of the twenty-four patients with arthritis included in this study by far the greater number who received thyroid therapy responded favorably. It is impossible to accurately evaluate these results inasmuch as other procedures were carried out at the same time, such as diet regulation (Pemberton),[31] weight reduction, removal of foci of infection, etc. We have the impres-

sion, however, that basal metabolic rate determinations should be made in all cases of degenerative (hypertrophic) osteoarthritis, particularly those occurring at or after the menopause in females, and that thyroid therapy is of benefit in those found with a low rate.

CONCLUSIONS

Certain general impressions may be had from personal experiences with much of this material, and from a careful study of it all.

1. That patients presenting certain symptoms of fatigue, general bodily aches and pains and apprehensive anxiety states should have basal metabolic rate determinations.

2. That it may be helpful as a guide to therapy in certain post-infectious states and at the menopause.

3. That such determinations should be made as a part of a study of male or female sterility when no organic or functional cause is found.

4. That such study should be made in all females suffering from menstrual abnormalities not explained on an organic basis.

5. That cases of habitual abnormal pregnancy should likewise be so studied.

Our impressions go further, to the extent that whenever in any of the above mentioned conditions a low basal metabolic rate is found, thyroid substance should be administered to an extent and for as long as seems sufficient to raise the rate to normal and maintain it there. It should be discontinued only if not tolerated, or after a sufficient length of time has elapsed so that it can be certainly declared ineffective. Our percentage of improvement in treated cases with adequate follow-up (62.8 per cent) supports this belief, which is further buttressed by the results in the treatment of sterility and threatened abortion. Finally, we are not yet prepared to designate these conditions definitely as hypothyroidism, but prefer, pending further study and experimentation, to call them simply states or conditions of lowered metabolism.

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REMARKS ON CERTAIN SPECIAL METHODS OF ANESTHESIA*

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SACRAL block is a very useful method of anesthesia. It will result in anesthesia and paralysis in the distribution of the sacral nerves, so that when it can be used it is superior to any form of local or regional anesthesia, or to general anesthesia, for operations on the anus.

Sacral block has been used in The Mayo Clinic since 1920. From July 1, 1924, to July 1, 1932, it was used in 7,134 cases. There have been practically no untoward results from its use when it has been properly carried out. There are fewer untoward results with sacral block than with the spinal anesthesia. Sacral block does not cause postoperative headache. I have never seen symptoms of meningitis following this technic. Relaxation is good, anesthesia is good, and breathing is quiet. Operating conditions are very favorable.

Preliminary medication is advisable. Some barbiturate, such as pentobarbital sodium (also called membutal) or sodium iso-amylethyl barbiturate (sodium amytal) should be used. I think their use is of advantage before sacral block because a barbiturate is an excellent antispasmodic and procaine is a convulsant when injected into the blood stream in sufficient amount. I have seen one patient go into convulsions after 3 c.c. of 1 per cent procaine had been injected into the caudal canal. The barbiturates, in addition, eliminate fear and apprehension, and a patient who is not excited and is not nervous on coming to the operating room is usually much more easily handled, and is much more pleased about the way he has been handled, than is a nervous patient.

The technic of sacral block has been described elsewhere by me.[2] It gives anesthesia for operations on the perineum and genital organs, on the uterine cervix but not the fundus, and on the rectum but not the peritoneum. It can be used in operative obstetrics but ordinarily is not

*From the Section on Anesthesia, The Mayo Clinic, Rochester, Minnesota. Read before the Minneapolis Surgical Society, Minneapolis, Minnesota, December 1, 1932.

used in normal labor. In operative obstetrics it is possible under sacral block, to do manual dilatation of the cervix, delivery by high forceps, episiotomy and repair after episiotomy.

Anesthesia appears about thirty minutes after injection of the caudal canal, but is not always bilaterally equal. The effect lasts for from one hour to an hour and a quarter, depending on the amount and concentration of the solution. There is not always as much relaxation with 1 per cent as with 2 per cent solution of procaine. We have not advocated the use of 2 per cent solution, however, and prefer to do sacral block with 1 per cent solution, which produces anesthesia in fifteen minutes, lasting from an hour and a half to two hours.

A block useful in many cases is effected by injection of the caudal canal and second sacral foramen on each side. With this block, anesthesia appears in about twenty minutes and lasts about an hour and a half. The solution should be injected at about body temperature, because cold solutions seem to produce anesthesia less quickly. The technic of blocking the sacral nerves is not as difficult to learn as is commonly thought. Its usefulness warrants the effort required to master it.

SPINAL ANESTHESIA

A technic of spinal anesthesia has been described elsewhere by Tovell.[7] Procaine is the best drug as yet available for inducing spinal anesthesia. It may be used in 10 per cent solution, or it may be used by the more universal and standard method of dissolving the crystals in spinal fluid. Its effect sometimes is not of sufficient duration, but it is seldom that some general anesthetic is entirely contraindicated; therefore, if the spinal anesthesia does not last long enough, or if it does not extend sufficiently high for the operation, supplementary general anesthesia may be employed. In many cases I have found it better to give a known safe dose of procaine intraspinally, and to supplement this effect with a gas or a gas and ether, as has been described elsewhere by me,[3] than to give a dose of procaine large enough to permit the operation to be performed under spinal anesthesia alone. In connection with spinal anesthesia one should avoid deep anesthesia by drop ether, because of the increased frequency of postoperative pulmonary complications following use of this combination of agents. When one must use spinal anesthesia only and must produce prolonged anesthesia, pantocain may be used alone or mixed with procaine.

The untoward results incident to the use of anesthetics given intraspinally have been investigated for a long time. Certain untoward effects of stovaine have been described by Spielmeyer,[5, 6] who has reported on the cellular changes in the spinal cord and on the changes in the myelin of the posterior columns. Early congestive changes produced by nupercaine and other spinal anesthetics have been described by Davis, Haven, Givens and Emmett. Permanent changes in the periphery of the spinal cord only (anterolateral and posterior columns) without cellular changes, and seen only in the experimental animal and not clinically, have been investigated by Essex, Kernohan and me, and are to be reported soon. The results of a study by Emmett on the differential effect of varying doses of procaine on several parts of the nervous system, together with clinical and experimental data, lead me to believe that in giving a spinal anesthetic one should bear in mind the number of cubic centimeters and the concentration of the solution as it leaves the syringe, as well as the dose and the rate and site of injection. For example, the effect produced by 150 mg. of procaine injected in 3 c.c. of solution tends to last longer than 150 mg. of procaine in 5 c.c. of solution. For the average person I find that a dose of 1 mg. for each pound (0.5 kg.) of body weight, not to exceed about 200 mg. for the average patient, would be a relatively safe dose, although debility would reduce the dose by 25 per cent or more, and outstanding robustness might indicate the safety of 1.25 to 1.5 mg. for each pound of body weight, up to 250 mg. I think that solutions should not be injected in concentrations of 10 per cent or stronger, and for ordinary work the solution leaves the syringe in a concentration of 3, 4, or 5 per cent. When a safe dose has been decided on, and the concentration of the solution to be injected has been decided on, then one can determine the point at which the injection should be made. The rate of injection should be about 0.5 c.c. each second for the purposes of uniformity, and without barbotage, except for aspiration of 0.5 c.c. of spinal fluid to determine if the spinal needle is still subdural at the end of injection.

The use of ephedrine has made spinal anesthesia somewhat safer, and has widened its ac-

ceptance. Certain unusual effects of this drug sometimes can be noted. A most interesting effect in some cases is excess stimulation of the circulation. This is accompanied by rise in blood pressure, followed by shortening or absence of spinal anesthesia, an unsatisfactory result from gas or gas and ether anesthesia, and difficulty in producing relaxation with drop ether anesthesia until the period of activity of ephedrine has elapsed. Such an effect may follow the use of a small dose, such as 25 mg. of ephedrine. This effect calls attention to the fact that the best method of using ephedrine has not yet been described.

The patient may expire while under the effect of the spinal anesthetic from any cause from which he might ordinarily expire, such as cardiac failure. However, the immediate accident that may terminate fatally is intercostal paralysis, followed by paralysis of the diaphragm, with extreme anoxemia and cardiac inhibition. It is possible in some cases, by artificial respiration and massage of the heart, to restore the patient and his physical functions, but if anoxemia has been prolonged, especially with cardiac function impaired or abolished for about four minutes, death may ensue immediately, or about thirty-six hours later, without a return to consciousness, although the pulse rate, blood pressure, and respiration may appear to be normal. One must, therefore, avoid this anoxemia, the onset of which is insidious and gradual. The administration of oxygen, with or without carbon dioxide, is of great importance when the blood pressure is falling, and especially so when respiration is inadequate. In certain cases one may use forced insufflation of oxygen by means of the gas machine, using only a face mask, and usually, in twelve to twenty minutes, respiration returns spontaneously. If recovery is delayed longer than this, the outcome is very grave.

When respiration ceases entirely, whether from spinal anesthesia or from any other cause, the most efficient method of supplying artificial respiration during operation is to introduce an intratracheal tube and use a pulmonary ventilator. This technic has been described elsewhere by me.[4]

From January 1, 1927, to July 1, 1932, spinal anesthesia has been used 7,891 times at The Mayo Clinic, and I have been impressed with the advantage of a uniform technic, including a dose estimated on weight of the patient, debility, risk, suitable site for injection, predetermined concentration of the solution, and a fixed rate of injection.

INTRATRACHEAL ANESTHESIA

Magill's method of intratracheal anesthesia differs from the older methods essentially in that he uses a soft rubber tube with a large lumen through which the patient breathes and through which the anesthetic may be inhaled or insufflated. The method of passing the greased tube through the nose, after the throat and larynx have been sprayed with a surface anesthetic and the patient has been anesthetized with a general anesthetic, is described by him as blind intubation, and if the tube cannot be successfully passed in this way, the laryngoscope may be used and the tube passed either through the nose or mouth, under direct vision.

During maintenance one follows the patient's condition and the depth of anesthesia partly by watching the activity of the breathing bag. Also, the color of the patient may be determined by comparison of the anesthetist's fingernail with that of either the patient's fingernail or toenail, or by watching the color of the ear, the lips, or the blood in the wound.

Preliminary medication for the average adult patient usually consists of 1.5 grain (0.1 gm.) of pentobarbital sodium the night before operation and 1.5 grain an hour before operation the next morning, together with morphine 1/6 grain (0.01 gm.) and atropine 1/150 grain (0.0004 gm.).

Intratracheal anesthesia is essential in operations on the lung, and is advantageous for diaphragmatic hernia, plastic operations on the face, operations on the eye, or operations on the neck. It is employed to advantage when a general anesthetic is being used and the respiratory passage is not free and patent, and in operations on the brain when it is anticipated that the patient may stop breathing, or in any case in which respiration stops for many minutes or hours. Insertion of the intratracheal tube facilitates artificial respiration either by the manual method, with the gas machine, or with the pulmonary ventilator.

I think Magill's method will become widely used because it facilitates both administration of a general anesthetic and ventilation of the patient, and because it quiets respiration and facili-

tates relaxation, and, therefore, gives flexibility in controlling the patient while he is anesthetized.

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INTUSSUSCEPTION*

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I HAVE assumed that an experience of some four score cases of intussusception might furnish material for an interesting presentation. It is not undertaken in the form of a comprehensive review of case records with statistical data, but rather to emphasize features of the disorder as seen by the pediatrician, especially as an aid to early diagnosis. For a fine statistical analysis of 1,028 cases including the series of Gibson, Wichman, Lichtenstein, Clubbe and others, I would refer you to the paper by Hess,[3] published in the Archives of Pediatrics in 1905.

One of the outstanding features of intussusception is that of age incidence. It is primarily a disease of infancy, some two-thirds of all cases occurring in the first year of life. A few cases are seen in later childhood, but it is rare after puberty. The matter of age then introduces certain problems of diagnosis and aspects of its surgical treatment. Description of subjective symptoms and coöperation in the physical examination cannot be called upon in the infant. Surgically, the patient six to twelve months of age, certainly presents peculiar anatomical, physiological, and immunological problems.

The etiology of intussusception is still rather obscure. Why should the condition be so definitely limited to infancy and why should one child meet with this adventure and others escape? Some of the theories advanced are as follows:

1. A mobile gut and as a corollary a long mesentery. This is probably an important factor. Kock and Oerum[5] found a freely movable, or "floating cecum," to be present in 42 per cent of infants and in only 17 per cent of older children.

2. The presence of some tumor mass, such as a diverticulum, mucus cyst, enlarged mesenteric glands. But in the majority of cases, such tumors are absent, while conversely these tumors are frequently found at operation in later life in individuals who have escaped intussusception.

3. Keen,[4] in discussing etiology, calls attention to the discrepancy in size of the large and small bowel, which at birth are equal, while at five years the colon is two to three and a half times as large as the small bowel. Were this a causative factor, intussusception should be more frequent in later life, which is contrary to experience.

I believe that some disturbance of innervation, anatomical or functional, combined with a floating cecum, best explains the etiology of intussusception. Irregular, incoördinated nervous impulses lead to a contracted segment of the gut in proximity to relaxed gut and a slipping or telescoping results. The condition is analogous to colic. Though the entity of colic has been denied by such eminent pediatricians as Sedgwick, nevertheless some babies are restless and suffer

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greatly from spasmodic abdominal distress, while others are calm and peaceful in the early months of life. Whoever has observed such a restless infant must have been impressed with the manifestation of a severe spasm of pain, which is instantly relieved by the relaxation of a segment of bowel with palpatory and audible evidence of the passage of gas through the bowel. It is conceivable that in severe cases of colic, partial, incomplete intussusception occurs. Senn,[7] in his work with cats, could produce intussusception by mechanically tucking the bowel inside itself. Further, he found that when the invaginated bowel was sutured in place, the gut made strenuous efforts to reduce itself and thus produce spontaneous recovery. This tallies with the experience which clinicians have had in that the tumor has not been found at operation, even when the history, physical findings and x-ray evidence have definitely pointed to a classical intussusception.

It is my belief that intussusception is a very frequent occurrence in infancy, that the majority are self reduced, and that only certain types in which nature fails to work out a speedy correction reach us as surgical problems. These latter cases show a tightly invaginated gut with constriction and circulatory disturbances such that spontaneous reduction cannot occur and an initial shock so characteristic of the disorder follows. Again the depth and duration of shock, as a rule, is a measure of operative findings. In case of mild symptoms of shock, time is not so important an element and the tumor is easily reduced. Conversely, with profound, persistent shock, one should expect to have difficulty in reducing the bowel and after lapse of a very short period of time the gut will be found edematous with evidence of beginning gangrene.

The pathology we need not discuss at length. As you know, the progress of the tumor is from above downward in distinction to the reverse in the terminal or agonal form. The location of the tumor we know to be variable, dependent upon the section of the bowel involved and the duration of the symptoms. A definite classification on the basis of the site of the invagination is largely academic, though it is true that the prevailing type in the first year of life is ileocecal. The important consideration is the early diagnosis of intussusception, irrespective of its site. Further, to the best of my knowledge, the symptoms are the same, regardless of the location. Perhaps what is not usually recognized is the frequent occurrence of double intussusception, that is, an intussusception section of gut may again invaginate bowel; even a triple formation may occur. Naturally such complex formations may greatly increase the difficulties of reduction. Multiple intussusception at different levels of the gut have been described, but fortunately are rare.

Symptomatology.—My excuse for again presenting an old topic is to simplify the early diagnosis through a wider knowledge of symptoms and signs. I feel there is ample justification for the effort because too many infants die each year from unrecognized intussusception or too tardy recognition. Then, too, the average text book gives as criteria for the diagnosis a group of findings which too often signify a late diagnosis and consequent doom of the infant. My first case in private practice was one of intussusception. Luckily I stumbled onto an early diagnosis and advised operation. But callowness of youth weighed against my opinion and the parents sought relief through the castor oil bottle rather than the surgery recommended. When too late to offer hope, the surgeon rightly refused operation. I followed this case through to exitus on the eighth day. Later my interest was further stimulated by association with Dr. A. W. Abbott. Together we observed a group of cases, many of them for some hours before operation, if there was little shock present. The time was spent in a close scrutiny of the child, observing the character, duration, and interval of pain; palpating of the abdomen during pains and during the free interval; checking palpatory with fluoroscopic findings; and especially noting the facial expression, outcry, and posture assumed by the little patient. Dr. Abbott[1] presented these observations before the Western Surgical Association in 1915. It was a fine clinical study of intussusception. Much I have to say may prove repetition, but if repetition may help save babies' lives I trust you will bear with it.

I believe in the great majority of cases of intussusception the early symptoms are so simple and clear cut that a novice can recognize them. I have made the diagnosis in several instances from the description given in telephone conversation. To disarm the charge of egotism, may I state that two mothers have made the diagnosis.

In one instance the child had a recurrence some months after operation. She did not call us to the home but brought the child directly to the hospital, as she stated, for another operation for intussusception. In another instance, a second child in the same family having intussusception, the mother called us for confirmation of her diagnosis before summoning a surgeon.

What then is this clinical picture? Briefly it is as follows: A well nourished (usually breast fed) normally developing child is suddenly and without warning seized with pain. It cries out, grows pale, perspires freely and goes into collapse or shock. This state lasts seconds or minutes, passes off completely and the child appears normal, may even resume play. The mother is greatly alarmed for a time, but as a rule the child's apparent speedy and complete recovery removes her fears and rarely is the physician called at this time. However, after a variable time (two to thirty minutes) the child again shows evidence of pains and, provided it is old enough to turn over, it will assume the knee-chest position in bed or on the floor. Frequently during the pain it will strain as in defecation. This phase may again last for seconds or minutes, pass off and the child again may resume play. This cycle will be oft repeated. The most striking analogy is that of labor pains. There may be periods of minutes or an hour or so free from distress, then a return of pain. The giving of food will usually cause a return of pain and an increase in its intensity. This cycle of outcry, pain with accompanying posture, I think is the most striking feature of intussusception and not to be confused with that of any other disease. Now other symptoms may appear. Shortly after onset, there is vomiting and about the same time passage of a normal appearing stool. Vomiting may or may not be repeated. Recurring vomiting is not a necessary part of the picture. Hyperactive peristaltic action of the bowels produces further evacuations, showing important evidence, namely, blood stained mucus with little or no fecal matter. This, added to the other symptoms, usually alarms the mother and at this stage the physician usually is called. This is the critical time in the story. The physician who obtains a true history of the onset and will take time to observe his patient for a brief period, will make the diagnosis. Too often, however, the condition is considered some form of enteritis and castor oil or other cathartic is given with disastrous results. At this stage the temperature and white count will be found to be normal. Palpation of the abdomen often fails to elicit a tumor. During paroxysms of pain the abdominal muscles are tense and the child resents examination, while during the interval of freedom from pain the entire gut relaxes and the mass may not be demonstrable. The definite, hard, sausage shaped tumor is usually a late symptom. The same may be said of detection of a tumor by rectal examination. It is poor medical teaching to emphasize the findings of a rectal tumor. The diagnosis should be made hours or days before such a tumor becomes palpable per rectum. However, rectal examination may be very helpful if on the examining finger mucus tinged with blood appears. Shelley[8] asserts that with bimanual palpation, one hand over the abdomen, a finger in the rectum, and the child held in the sitting position, a sensation similar to ballottement may be obtained. Fluoroscopic examination may help confirm the presence of tumor by a line of demarkation of a gas-filled bowel above the obstruction and the absence of gas in the collapsed bowel below. Or one may give a barium enema which may determine a level of obstruction provided it is below the ileo-cecal valve.

The majority of cases are as typical as described. However, there are two variants. First, the very acute, fulminant type in which the infant goes into shock and does not come out. In such a case the cycles of pain are not as apparent and the infant does not assume the striking, typical posture. In these cases one will find the gut tightly invaginated, the circulation cut off, with consequent edema and gangrene in surprisingly short time. Secondly, the chronic type. In these cases there is a typical abrupt onset but with little shock, the pains are not as typical or severe, obstruction of the bowel is not complete, so that gas and some fecal matter may be passed. Further, there may follow periods of days when the child appears normal and then symptoms will return in a mild form. We followed such a case for two weeks. Dr. Abbott eventually operated, found a large tumor, which, strange to say, was easily reduced at that late date and the patient made a speedy recovery. Lichtenstein reports a case of eleven years duration. As you know, some chronic cases have worked out a spontaneous cure by sloughing of the invaginated gut,

but needless to say delay with this in prospect is not good treatment.

In summation, it is my contention that the early diagnosis of intussuception is to be made from the history and careful observation of the patient; that the typical text-book picture is an eleventh hour finding. Further, though it may be open to question because of the element of fear introduced, I feel an intelligent mother could be instructed to recognize intussusception when it occurs.

Now as to treatment. It should be surgical. The report of 400 cases by the Danish observers, Kock and Oerum, in which treatment by injection or the "bloodless method" was employed, is instructive. The bloodless method consists of anesthesia by chloroform plus taxis plus the injection of 500 to 1,000 c.c. of water into the lower bowel. In their age group under one year, their mortality rate for the bloodless method was 35 per cent and their operative mortality was 74 per cent. Surgery was usually called upon after failure of the bloodless method. It is my feeling that the mortality rate for both methods is disgracefully high. We have had a few cases, seen soon after the onset of suggestive symptoms, in which the diagnosis was not certain, in which we have employed the injection of barium with low pressure. Under the fluoroscope the barium proceeds through the colon by fits and starts, due doubtless to spasm of the bowel, so that it is extremely hard to determine whether an obstruction has existed or not. However, in a case of intussusception of many hours duration and certainly where a definite tumor can be palpated, I shall never treat by injection of air, water, barium or any other substance. It is unthinkable that such measures will reduce an advanced case with an edematous gut, beginning gangrene and especially the compound variety, with as great safety as surgery offers. The temptation is great to use dangerous pressure. Mortimer[6] found that a pressure of five feet of water was sufficient to stretch the peritoneum to the cracking point and cause rupture.

There is still another portent with the blind reduction by injection or inflation. The appendix may become involved in the mass in such a manner as to cut off its circulation. Even with successful reduction of the intussusception a gangrenous appendix may cause subsequent peritonitis. So, with a well confirmed diagnosis of intussuception I shall always employ operation.

Then, too, there remains the fear of incomplete reduction or recurrence. I feel that the best insurance against recurrence are the post-operative adhesions. In spite of the protective adhesions recurrences are encountered. One occurred in my series. Cohen[2] reports forty-four operations for intussusception in twenty-one patients, two patients having been operated upon three times.

Never having opened an abdomen it may be heresy for me to discuss surgical treatment. Nevertheless, after the surgeon has made his dramatic attack, often the pediatrician is left to hold the fort, to inform the parents disaster is imminent or to help soothe their troubled souls after the demise of the patient. So, during the years I have made certain observations. These I reported some years ago, but will briefly recapitulate.

1. Restore the water balance of the infant as quickly as possible.
2. Prevent loss of body heat to lessen shock.
3. Avoid loss of blood to prevent shock.
4. Give as little anesthetic as possible; the margin of safety is very narrow in the infant.
5. After operation give food as soon as possible and in generous amounts; the infant stands starvation badly.
6. Isolate the patient as completely as possible. The infant possesses little if any immunity and a complicating upper respiratory infection usually results in a fatality.

I have also made some observations on surgical technic and ask your indulgence in stating them.

1. Reduce the intussusception and terminate the operation as soon as possible. Unless the circulation of the appendix is greatly impaired and gangrene threatens, leave it alone. Often sudden death in the period twelve to twenty-four hours after operation, when the patient appears to be doing nicely, is due to thrombosis of mesenteric vessels and subsequent embolism. The less trauma the less the opportunity for this unfortunate result.
2. In infants under one year, we have never had a case of resection of the bowel recover. Some other technic should be employed. Of course, best of all is an early diagnosis with prompt treatment and the avoidance of gangrene.
3. In three cases of intussusception, we have seen evisceration following the bursting open of

the abdominal wound, in each instance no retention sutures having been inserted. In the infant either the sense of pain is less or the absence of fear is such that you cannot expect it to long remain quiet in the prone posture. If old enough and not persistently restrained, it may be walking around the crib soon after operation. Certainly painstaking closure of the wound and the best retention possible should be employed.

I have tried to paint a clinical picture of intussusception to aid in its early diagnosis. Too many cases are still overlooked or recognized too late. Since it is largely a disease of infancy, I have tried to outline a program under which, we have found from experience, convalescence is smoother, speedier and more assured.

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FATAL POSTOPERATIVE PULMONARY EMBOLISM*

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PULMONARY embolus is one of the most serious and most dreaded of all postoperative complications. It usually occurs as a surprise to the surgeon and little or nothing can be done in the way of treatment because of the rapidly fatal termination. Besides being a shock to the physician it is a calamity to the relatives because it occurs during convalescence some days after the patient has successfully weathered the surgical procedure. There is no need to describe the clinical picture, as it is doubtless familiar to all, and no one need strain his memory to recall some outstanding case that terminated fatally from this most dramatic of maladies.

REVIEW OF THE LITERATURE

The incidence of fatal pulmonary emboli as given by various writers is shown in Table 1. Most authors give the average age of its occurrence as more than fifty years. Rehn[40] gave the average age as fifty-five and six-tenths years and Henderson[19] as fifty-three and two-tenths years. Apparently the danger is increased by age as the literature stresses the extraordinarily low incidence of pulmonary embolus in young persons. However, there is a recent report by Jones[23] of a pulmonary embolism in an infant seven months of age which followed mastoidectomy for aural infection. Necropsy showed a long rounded embolus in the pulmonary artery.

Sex does not appear to be a factor although Popper[38] and Rehn[40] stated that it occurred more often in women.

The following contributory factors have been gathered from the literature, based on the conclusions of numerous authors.

1. Meteorologic factors seemed to be involved in thirty-five cases studied by Fritzche.[34] Owen[35] stated the belief that the incidence varied directly with the prevalence of influenza and, therefore, seasonal occurrence was suggested.

2. Slowing of the circulation from mechanical means according to Welsh,[48] Bancroft and Stanley-Brown,[3] or from myocardial degeneration as shown by Lemon and Willius[27] in that myocardial injury was found in 42 per cent of cases of fatal pulmonary embolism, has been suggested.

3. Injury to the walls of the vessels and en-

*From the Arrowhead Clinic, Duluth.

TABLE I. INCIDENCE OF FATAL PULMONARY EMBOLISM AS GIVEN BY VARIOUS AUTHORS

Investigator	Cases studied	Percentage of post-operative deaths	Percentage death in all operative cases	Comment on deaths from pulmonary embolism
Dahl-Iversen and Ramberg	18,168*			636 cases of phlebitis, thrombosis and embolism which does not represent an increase
Detering				Fivefold increase
Dornrich				Increase of 3 to 4 times since 1924
Spiegel and Farr	1,116 necropsies		2.68	30 fatal emboli
Giessendorfer				Not on the increase
Gruber				Increase from 0.68 to 3.46 per cent
Henderson (Mayo Clinic)		6		
Hosoi	64		0.09	0.08 per cent of all gynecologic cases
Killian (Freiburg Clinic)		1		
Prochnow	12,777 prewar		0.13	
	17,531 postwar		0.12	
Schmidt (University of Breslau)	6,114**		0.42	
	10,297***		0.05	
Snell (Mayo Clinic)		8 to 10	0.2	
Sluger and Bozsin				
Walters (Mayo Clinic)	63,347†		0.32	Enormous increase in recent years
				267 fatal emboli

*Operative cases. **Gynecologic operations. ***Obstetrical cases. †Major operations.

dothelium seems to be a factor. Phlebitis has been of dangerous significance in the reports of Joel.[22] However, Brown[7] studied eighty-seven cases of postoperative phlebitis without encountering one complicating pulmonary embolism. Thomas and Alyea[45] reported thrombophlebitis as rarely yielding fatal embolism as the embolus is usually dislodged before phlebitis is recognized clinically. Bernheim,[4] and Hampton and Wharton[18] reported a low incidence of grave pulmonary embolism after phlebitis but a high incidence of pulmonary infarction. Varicose veins are of little, if any, significance.

4. Dehydration causes an increase in viscosity of the blood according to Miller and Rogers.[32]

5. Changes in the consistency of blood seem to be a factor. In Allen's work[2] the erythrocytes, leukocytes, prothrombin time, fibrinogen and lipoids show definite and constant changes after operation.

6. Diaz Sarasola[11] believed the essential factor to be a predisposition to the formation of thrombosis or a condition of latent thrombophilia. Rehn described the "embolic habitus."

7. Postoperative infections were common in Henderson's series[19] of fatal emboli.

8. Schmidt[42] gave poor general condition and reduced resistance as the decisive factors in embolic fatalities. Sixty-seven per cent of Killian's cases[24] had an unfavorable prognosis preceding fatal embolism. Dornrich[12] and Diaz Sarasola[11] stated that there was an increased frequency of embolism in cases of malignant tumors.

9. According to Henderson[19] there is no great difference in the number of deaths from pulmonary embolism following operations on the upper and lower abdomen. Miller and Rogers[32] and Giessendorfer[15] stated the belief that it may follow any operation on any organ but that it is rare following appendectomy. Prochnow[39] found

that emboli followed, in order of frequency, operations for abdominal hernia, uterine myoma, ileus and carcinoma of the stomach.

10. That chronic poisoning from exhaust gases of automobiles caused disposition to thrombosis and embolism was suggested by Knutzen's experiments.[26]

11. Obesity increased liability to embolism as shown by Snell.[43]

12. Traumatization of fat has been considered a factor for, if emulsified fat is injected intravenously or intraperitoneally, the blood clotting time is shortened.

13. Miscellaneous factors such as reduced diaphragmatic respiration, normal or subnormal blood pressure and intestinal stasis are thought to play a part.

Intravenous therapy has no apparent relation to pulmonary embolism in the opinion of Killian,[24] Giessendorfer,[15] and Adolph and Hopmann.[1]

In summary of these factors Hueck[21] stated that investigators have been unable to ascribe the process to any single factor.

From the literature embolism occurs usually about ten days after operation. It is now generally agreed that the source of the embolism is the veins of the lower part of the body such as the iliac, femoral, hypogastric and pelvic or prostatic vein and not those in the surgical field. The left femoral vein is by far most commonly responsible.

The cause of death from pulmonary embolism was thought by Frey[13] to be due to cardiac failure caused by the reflex and mechanical effect of the embolus. Bieling[5] stated that the immediate results of embolism are only apparent death and the patient present the aspect of shock rather than suffocation, for the excluded portion of the lung is usually not large. He emphasized the use of cardiac stimulants and artificial respiration even after apparent death. Haggart and Walker[17] showed experimentally that loss of 52 to 60 per cent of the pulmonary circulation is required to cause death in a cat.

TREATMENT

Several prophylactic measures have proved useful. Walters[47] reduced the incidence of pulmonary embolism from 0.34 to 0.09 per cent by the use of thyroid extract. Popper[38] concluded that thyroxin does not prevent thrombosis and embolism. Boschamer's experience[6] with thyroxin was not entirely satisfactory as hypertonia without pulse modification developed in some patients and others were resistant to thyroxin. Nicolaysen[33] used a combination of thyroid extract and ephedrine and recommended its use. Fluids up to 3,000 c.c. daily, administered preoperatively and postoperatively by subcutaneous, intravenous and rectal routes, early exercise of legs and arms with deep breathing according to Pool,[36] loose abdominal binders as stressed by Bancroft and Stanley-Brown,[3] measures to combat postoperative nausea and vomiting so as to keep the abdomen quiet, and avoidance of traumatization of fat, are other prophylactic measures which have been advocated.

Miscellaneous procedures have been recommended; cardiac stimulants in case of myocardial insufficiency; 30 cm. elevation of the feet in bed for a week after operations or fractures of the lower extremities for all patients more than twenty years of age as advocated by Nicolaysen.[33] Ephedrine sulphate when the pulse curve is above the temperature curve is stressed by Boschamer.[6] Calcium chloride for all patients more than thirty years of age, for eight consecutive days after operation or injury, was thought to be of value by Martin[30]; and sodium thiosulphate given intravenously was recommended by Bancroft and Stanley-Brown.[3] In cases of thrombosis Payr[37] recommended applications of hot air and of mustard plasters twice daily to the extremity.

Active treatment recommended in cases of pulmonary embolism consists of oxygen with artificial respiration and cardiac stimulants as used by Lotheissen;[28] intracardiac injections of epinephrine which gave Lutaud[29] good results; and surgical removal which has proved successful in two cases of Nystrom,[34] in one case of Kirschner,[25] and two cases each of Crafoord[8] and Meyer.[31] The time element and delicateness of the procedure are factors limiting successful removal.

MATERIAL

A study was made of all cases diagnosed pulmonary embolism since 1924 at St. Mary's and St. Luke's Hospitals, Duluth. After a critical culling in which all medical cases and those in which there was the slightest doubt as to the accuracy of the diagnosis were discarded, twenty-

eight cases of fatal postoperative pulmonary embolism remained, fifteen cases from St. Mary's Hospital, and thirteen from St. Luke's Hospital. The histories of the cases were reviewed from every possible angle in an effort to obtain information which might be of aid in clarifying to some degree knowledge of this condition.

AGE AND SEX

The oldest patient was seventy-five years of age and the youngest was only eighteen years. Embolism had occurred in the latter after a simple appendectomy. The average age of the entire group was fifty-one years, which coincided with the reports in the literature. Sixteen (57 per cent) were more than fifty years of age and twelve were less than fifty years. The number of patients in each decade of life was as follows: from eighteen to twenty years, one; twenty to twenty-nine years, two; thirty to thirty-nine years, four; forty to forty-nine years, five; fifty to fifty-nine years, seven; sixty to sixty-nine years five; seventy to seventy-nine years, four.

The sex ratio was not in keeping with that of the literature as twenty-one patients (75 per cent) were women and seven (25 per cent) were men. There is a factor of error to be considered here as more women than men were operated upon in both hospitals.

YEAR AND SEASON

The time of year had no relation to the formation of pulmonary embolism. Of the twenty-eight cases studied three cases occurred in January, one case in both February and March, three cases in April, two in both May and June, one case in July, three cases in August, two in September, four in October, five in November and two in December. During the winter months there were sixteen (57 per cent) cases and during the summer months twelve (43 per cent).

CONDITION OF PATIENTS

The patients were analyzed as to body weight or state of nutrition with the following results. Data were available in twenty-four of the twenty-eight cases. Of these twenty-four patients ten were obese, six were well nourished, five moderately nourished, and three undernourished. These figures tend to show that patients in good state of nutrition are more susceptible to pulmonary embolism. This is in accordance with the work of Snell.[43]

Likewise the condition of the patients preoperatively was studied. The condition of ten (35 per cent) was good, of thirteen (46 per cent) fair, and of six (19 per cent) poor. The patient's condition was said to be good if the physical examination showed the absence of a major physical disability; fair, if minor changes such as fever, respiratory infection, localized peritonitis, attacks of vomiting or diarrhea, diabetes, mild cardiac involvement, and so forth, were present. The six cases were classified in poor condition because of chronic ulcerative colitis of two years' duration with marked emaciation in one case, generalized peritonitis from a ruptured appendix in one, generalized peritonitis from ruptured duodenal ulcer of four and one-half hours' duration in one, erysipelatous phlebitis of the left leg and infected hydrocele in one, moderately severe valvular heart disease in one, and age which was seventy-five years with myocardial failure in one.

These figures show that a fairly large percentage (65) of these patients were not in good condition prior to surgery. This high figure is unquestionably of some significance and should be ample reason for considering the possibility of embolism in all patients undergoing operation who are not in good condition.

The cardiac status was studied preoperatively from the standpoint of blood pressure and cardiac findings. The blood pressure was obtained in nineteen cases, nine of which were normal, and ten above normal. Pressures below 150 systolic and 90 diastolic measured in millimeters of mercury were considered normal. The lowest blood pressure found was 120 systolic and 80 diastolic, the highest, 235 systolic and 130 diastolic. The average pressure was 159 systolic and 94 diastolic. In four cases with hypertension the heart was enlarged.

These figures show that all ranges of blood pressure were present. The average blood pressure of 159 systolic and 94 diastolic is probably significant in that it shows that the level of the blood pressure disregarding cases of cardiac insufficiency is not significant in pulmonary embolism.

OPERATION AND ANESTHESIA

There seems to be no body site or type of operation immune to embolism. The various operations in my series are given in Table II. Procedures in the lower part of the abdomen slightly predominated.

TABLE II. OPERATION AND ANALYSIS OF LOCATION OF OPERATIVE FIELD

Operation	Cases	Per cent
Appendectomy with drains	2	
Without drains	1	
Appendectomy and oöphorectomy	2	
Appendectomy and ventral hernia	1	
Appendectomy and cholecystectomy	4	
Cholecystectomy	4	
Taking down of gastro-enterostomy and excision of gastro-jejunal ulcer	1	
Repair of ruptured duodenal ulcer	1	
Gastro-enterostomy	1	
Uterine suspension and repair	1	
Hysterectomy	3	
Exploration	1	
Herniotomy	1	
Prostatectomy	1	
Vasectomy and cystostomy	1	
Drainage of infected hydrocele	1	
Thyroidectomy	1	
Operation for bilateral cataracts	1	
Location of operative field		
Upper part of abdomen	7	25
Lower part of abdomen	12	42
Combination of upper and lower parts of the abdomen	6	21
Extra-abdominal operations	3	12

Various anesthetics were used but the frequency of spinal anesthesia seems to be significant. What effect spinal anesthesia has on the general condition of the patient is only conjectural. General anesthesia was used in eighteen cases, in which ether and ethylene were given in two cases, ether and nitrous oxide in six, ether alone in five and ethylene alone in five. Spinal anesthesia was used in six cases and local anesthesia in four.

Embolism occurred at a slightly shorter interval following operation than the average time reported in the literature. The shortest period was three days and the longest thirty-one days with an average of six and nine-tenths days following operation.

CONDITION OF PATIENT AT TIME OF EMBOLISM

The condition of the patient at the time of embolism can best be given in the following manner. Twenty-four patients had fever ranging from 99° to 103° F. and four had normal temperatures at the time of the embolism. Of the twenty-four cases with fever, complication in the thorax shown by bloody sputum, pain and so forth was present in seven; thrombophlebitis was present in five. In nine cases no apparent cause for the fever was found and the wound was thought to be responsible in three.

These figures seem to show that these patients were very sick at the time the embolus occurred and suggest also that infection plays a important rôle in pulmonary embolism. They also tend to change the general consensus of opinion, that patients are generally in good condition when the embolus occurs.

Postoperative thrombophlebitis occurred in six cases as follows: two days after operation and one day before death in one case; nine days after operation and three days before death in one; thirteen days after operation and two days before death in one; eight days after operation and one day before death in one, twenty-two days after operation and three days before death in one; and eleven days after operation and one day before death in one. In two cases the leg was found to be edematous at necropsy. This prevalence of thrombophlebitis is striking and is in direct opposition to the work of Brown,[7] who did not find a single case of fatal embolism in eighty-seven cases of postoperative phlebitis.

LENGTH OF LIFE AFTER EMBOLISM

Death occurred within thirty minutes after the embolus in thirteen cases of my series, from thirty minutes to one hour in six, from one to one and a half hours in two, from one and a half to two hours in two, in three and a half hours in one case, in eleven hours in one, in seventeen hours in one and in twenty-four hours in two cases. The shortest time was five minutes and the longest twenty-four hours. These figures show that if surgical intervention is to be considered as a method of treatment it must be extremely prompt after the occurrence of the embolus.

DEHYDRATION AND LABORATORY RECORDS

An attempt was made to study the fluid intake of the patients in order to ascertain the part that dehydration might play in this condition. A summation was made of the daily intake by mouth, intravenously, subcutaneously and rectally. An arbitrary line was drawn in that all intakes of less than 1,600 c.c. daily were con-

sidered inadequate and those over 2,000 c.c. adequate. Fluid intake was found to be adequate in sixteen cases and inadequate in twelve. These figures show nothing conclusive in regard to the present problem but emphasize that many postoperative cases have an inadequate fluid intake.

All laboratory reports were investigated without finding any condition relative to the blood counts, blood chemistry, urinalysis and so forth that was in any way sufficiently common to be of any significance.

Postoperative orders directed toward prevention of emboli were not frequently seen on the order sheets in the cases studied. Only one patient in the entire group received thyroid extract and only frequent movement of the patient was stressed.

NECROPSY OBSERVATIONS

Necropsy was done in fifteen cases (53 per cent) of the group. The presence of thrombosis in the veins of the pelvis and lower extremities at postmortem examination in twelve cases in my series is significant. Thrombi were present in the left femoral vein in five cases, in the left saphenous vein in one case, in the left ovarian vein in one, in the right ovarian vein in three cases, and in the right femoral vein in two. That the left iliac and femoral veins apparently represented the chief source of the thrombosis is in accordance with the views of Robertson.[41] That the pulmonary emboli probably represented the entire thrombus in four of the cases probably accounts for the absence of thrombi elsewhere. The source of these emboli is proved additionally by the fact that some of the emboli were long, some as long as 34 cm., and were exact casts of the veins of the lower extremities.

In the lung the size of the embolus was directly related to the rapidity of death. If the entire pulmonary artery was occluded, death followed in a very few minutes. In these cases no infarction of the lung, such as occurs from small emboli, was present. The exact location of the embolus, which was given in only twelve cases, was: in the pulmonary artery in eight, in the left lung in three and in the right lung in one case.

In only one case in the entire group was a malignancy found. This was a carcinoma of the prostate gland. The hearts in the entire series were uniformly enlarged in proportion to the level of the blood pressure.

SUMMARY AND CONCLUSIONS

Twenty-eight cases of fatal postoperative pulmonary emboli were reviewed from a clinical and pathologic basis. The average age at which pulmonary embolus occurred was fifty-one years, the youngest patient being eighteen years of age and the oldest seventy-five years. Pulmonary embolism occurred more commonly in patients who were more than fifty years of age.

The sex ratio in this series was three women to one man. A factor of error based on the fact that more women than men were operated upon is to be considered.

More emboli have occurred in the first nine months of 1932 in this group of cases than in any single year. This is of importance when it is considered that fewer operations have been done than in any single year before. No easy explanation for this increase can be ventured.

Obesity and overweight seemed to play an important rôle in the etiology of embolism. The body region or type of operation was not significant.

Sixty-five per cent of the patients were not in good condition before operation, and the average blood pressure in the group was somewhat above normal, that is, 159 systolic and 94 diastolic in millimeters of mercury.

As to the type of anesthetics employed the frequency of the spinal type seemed only slightly suggestive of an etiologic relationship.

Embolism occurred on an average of six and nine-tenths days after operation. That the patients were not in good condition just prior to a fatal embolism, as is the usual conception, and that infection was frequently present are shown by the presence of fever in a large percentage (85) of cases. Thrombophlebitis also proved to be a serious etiological factor in pulmonary embolism.

Death was extremely rapid in the greater number of cases, twenty-three of the twenty-eight patients having died within two hours. The observations at postmortem examination coincide with previous investigations in that the pelvis and lower extremities were the site of formation of the emboli and that the speed of death depends on the amount of pulmonary circulation which is impaired.

Finally, postoperative measures to possibly prevent pulmonary embolism were not taken except in a few cases.

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TRANSPLANTATION OF THE URETERS TO THE SIGMOID COLON FOR EXSTROPHY OF THE BLADDER AND OTHER URETERAL ABNORMALITIES WITH URINARY INCONTINENCE*

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FOLLOWING Coffey's report of the submucous method of transplanting the common bile duct and the ureter into the intestine in experimental animals, C. H. Mayo, in 1912, applied the method clinically to ureteral transplantation for the treatment of exstrophy of the bladder and other vesical and urethral abnormalities in which the bladder failed to hold urine. The results in these cases, including those in which exstrophied bladders were removed and plastic operation performed on the penis, have established these procedures as the preferable ones in the treatment of these conditions. Transplantation of the ureters to the sigmoid colon permits control of urine by competent anal sphincter. It permits removal of the exposed, irritated bladder which is prone to the formation of carcinoma and it prevents dilatation of the ureters, and sequelæ due to pyelonephritis which cause death in most cases in which treatment is not carried out.

In April, 1931, I presented a summary of seventy-six cases of exstrophy of the bladder, including cases of complete epispadias, in which transplantation of the ureters to the sigmoid colon had been performed at The Mayo Clinic. This method consisted of the transperitoneal transplantation of the ureters to the sigmoid colon in separate stages, with an interval of from twelve to fourteen days between operations. The original method of submucosal transplantation reported by Coffey was used. The transplantations were done without the use of catheters. The number of these cases has now increased to eighty-four. Most of the patients were operated on by C. H. Mayo. In the last seven years, I have operated on twenty; sixteen for exstrophy of the bladder, two for complete epispadias, and two for congenitally deformed or traumatized urethras with total urinary incontinence. In the entire series of cases, the mortality rate was approximately 4 per cent based on the number of cases, not operations. In approximately 81 per cent of the cases, excellent results were obtained from operation; in 14 per cent results were fairly good, and in 5 per cent they were unsatisfactory. More than five years have elapsed since operation in twenty-seven cases, and ten years have elapsed since operation in thirteen. In forty of the cases the patients were operated on before the age of fourteen years, and in seventeen they were operated on between the ages of fifteen and thirty-four years. In two of the series of seventy-six cases, the exstrophied bladders were carcinomatous; one of the patients was a child aged six years, the other a woman aged twenty-three years.

Although approximately accurate estimations of renal function could be made subsequent to the operation by a study of the nitrogen constituents of the blood, the advent of intravenous urography added exceedingly valuable information in outlining the renal pelves, calices and ureters, thus permitting more accurate determi-

*From the Division of Surgery, The Mayo Clinic, Rochester, Minnesota. Read before the meeting of the Interstate Postgraduate Medical Association of North America, Indianapolis, Indiana, October 17 to 21, 1932.

nation of renal function and of whether ureteral obstruction was present. The results in fifty-nine of the seventy-six cases in which the Mayo method of ureterosigmoidostomy was carried out and the exstrophied bladder removed have been described in detail. In 50 per cent of the cases, there has been no evidence of renal infection subsequent to operation; in 21 per cent of the cases slight evidence has occurred at long intervals; usually the infection is manifested by the presence of fever lasting for a day or two with or without pain in the lumbar region. However, there may be weeks and months of comfortable existence between episodes. The infection is apparently mild and has little sustained effect on the patients. If the patients are children, they continue, apparently, to develop satisfactorily and become immune to the infection. Further evidence of the mildness of the renal infection is the fact that of the nine patients who died at home, in periods varying from one to seven years subsequent to the ureteral transplantation, only one patient presented definite evidence of renal infection as the cause of death.

The cinema film illustrates the method of submucosal transplantation which has been used in all of our cases, the distal 2.5 cm. of the ureter being carried between the mucous membrane of the muscularis mucosa of the rectosigmoid. That such a valve functions satisfactorily was assumed if the patients did not present evidence of pyelonephritis. Intravenous urograms had confirmed the assumption that normal renal function without hydronephrosis can be expected in cases in which the anastomosis has been made accurately. Although the most suitable age at which to carry out the operation would seem to be in early childhood, preferably not before the age of three and a half years, or until such time as the child has obtained complete control of the rectal sphincter, yet good results have been obtained in cases of adults. Three cases illustrative of this follow:

A man now aged forty years, whose ureters were transplanted to the rectosigmoid colon and the exstrophied bladder removed in 1916 by C. H. Mayo, has not been ill since the operation and there has never been any evidence of renal infection. Intravenous urograms have shown the renal pelves and calices to be normal in size, and the concentration of dye in these areas has been normal. The values of nitrogen in the blood have also been normal. He is able to hold urine in his rectum for four to five hours during the day and from six to eight hours during the night. In December, 1930, I performed a plastic operation on the penis, with correction of epispadias. Two women on whom ureterosigmoidostomy for exstrophy of the bladder was done in 1913 and 1917 respectively, were later married. The former was delivered of normal twins in 1924 and the other was delivered of a normal child the same year. Excellent operative results have continued. The former of these two patients was aged thirty years when the operation was performed.

Besides achieving urinary control and removing a chronically irritated and infected bladder, there has been noticeable improvement psychologically of the patient's viewpoint on life.

INDICATIONS FOR THE OPERATION

Not only is operation indicated in cases of exstrophy of the bladder in which transplantation of the ureters to the sigmoid colon seems to be indicated, but in cases of complete epispadias, absence of urethra and complete urinary incontinence. Also it would seem to be indicated for other abnormalities of the urethra with complete urinary incontinence, either congenital or the result of injury to the urethra and its sphincter; for extensive vesicovaginal fistulas, unsuccessfully treated by plastic operations on the bladder and vagina, and finally, for extensive carcinoma of the bladder whose removal or treatment by any other method of procedure would appear inadvisable.

The time for this presentation does not permit a consideration of ureterosigmoidostomy for treatment of extensive, malignant tumors of the bladder in which anything but total cystectomy seems inadvisable. In such cases different conditions exist and different problems present themselves, for in addition to the debilitating effects of malignant lesions of the bladder on the patients' general condition, dilatation of the upper portion of the urinary tract and infection is practically always present. In such cases any operative procedure, even cystostomy, frequently carried a high operative risk. This condition of renal and ureteral obstruction and infection is practically always absent among children who have exstrophy of the bladder. Their ureters are usually almost normal in size and the kidneys

are without infection. It is to these factors and to the division of the transplantation into stages that I attribute the low mortality rate of ureterosigmoidostomy in the treatment of exstrophy of the bladder when it is carried out in separate stages for children. When exstrophy of the bladder, however, has been allowed to remain into adult life, dilatation of the ureters or infection of the kidneys has occasionally occurred to a greater or lesser extent, and hence the greater risk of ureteral transplantation for exstrophy of the bladder for the adult.

UNILATERAL VERSUS BILATERAL TRANSPLANTATION

It was C. H. Mayo's experience and it has been mine, that it is unnecessary to use either tubes or catheters in transplanting ureters to the sigmoid colon if one normal sized ureter is transplanted at a time. Experience at the clinic would seem to indicate that in the treatment of exstrophy of the bladder and other congenital abnormalities of the bladder and urethra, with total incontinence, that the risk of such operation is far less, particularly for young children, than that of simultaneous bilateral ureteral transplantation.

In the last few years various summaries of the results of ureterosigmoidostomy have appeared in the literature of this and other countries[4,9,10,11,13] with good results in cases of unilateral and bilateral simultaneous transplantation. A review of these cases, however, seems to establish the fact that bilateral simultaneous transplantation of the ureters to the sigmoid colon for exstrophy of the bladder carry mortality rates far in excess of transplantations when done in separate stages. Indeed on the basis of cases, not operations, this difference has been as great as the rate of 15 or 20 per cent as compared to 4 per cent when the ureters are transplanted separately. Cabot's report of fourteen cases of exstrophy in which the ureters were transplanted in separate stages without mortality, is a striking example of the safety of the procedure when carried out in two stages. The cause of death in cases in which bilateral simultaneous transplantation has been done, has been reported elsewhere as being due for the most part to the sloughing of the anastomosis or the end of the ureters to which the pressure of the catheters may have contributed, and to shock. These factors are lacking in the transplantation of first one ureter and then the other because tubes and catheters are not used and hence pressure necrosis cannot occur, and because the actual time of the operative procedure is reduced by more than half. This shortening of the operation, although usually of but moderate importance in operating on adults, appears to be an important factor in the risk of any operative procedure on children.

The time during which patients were in the hospital as compared with that following simultaneous bilateral ureteral transplantation shows the average length of time to be approximately the same. Moreover, in many of the cases a plastic operation was done on the penis either at the time the bladder was removed or a few days later in addition to the transplantation and removal of the bladder.

In a comparison of postoperative progress in the two groups of cases, it was noted that the reactions from the operations were more severe and more prolonged, as indicated by irregularity of fever and increase of pulse rate, when both ureters were transplanted simultaneously. It has been my experience that when one ureter at a time is transplanted, postoperative reactions are usually slight. The period of fever and increased pulse rate lasts for a few days subsequent to transplantation of the first ureter only, and following the transplantation of the second ureter very little reaction occurs. With the patient in good condition, removal of the exstrophied bladder and a plastic operation on the penis are operations without appreciable risk.

The ureteral catheter is of value in certain cases in which dilated ureters exist due to obstruction, either from an extensive inflammatory process around the ureteral orifice or from extensive malignant lesions of the bladder involving the base and the trigone. If, after due consideration, ureteral transplantation is considered as the best procedure in the case of extensive carcinoma of the bladder, as a preliminary to or as a part of the cystectomy, it may be true that it is better to accept the increased risk of the operative procedure and to perform simultaneous bilateral ureteral transplantation using catheters as described by Coffey, rather than to divide the operation into stages.

SUMMARY

Transplantation of the ureters to the sigmoid colon permits control of urine by the competent

anal sphincters, and it permits removal of the exposed, irritated exstrophied bladder which is prone to the formation of carcinoma.

In a group of eighty-four cases of exstrophy of the bladder, including cases of complete epispadias, in which transplantation of the ureters to the rectosigmoid has been carried out at The Mayo Clinic, the mortality rate was approximately 4 per cent, based on the number of cases, when the method of transplanting one ureter at a time was employed, with an interval of from ten to fourteen days between the transplantations.

In approximately 81 per cent of the cases excellent results followed the operations; in 14 per cent results were fairly good; in 5 per cent they were unsatisfactory. More than five years have elapsed since operation in twenty-seven cases and ten years have elapsed since operation in thirteen.

Studies of renal function subsequent to operation by intravenous urography and studies of the nitrogen content of the blood would indicate that when the anastomosis is accurately made, the kidneys function normally.

Our experience would seem to indicate that it is unnecessary to use either tubes or catheters in transplanting the ureters to the sigmoid colon if one normal sized ureter is transplanted at a time; this is particularly true in the treatment of exstrophy of the bladder, when the risk of such operation is far less, particularly for young children, than that of simultaneous bilateral ureteral transplantation. The time patients remained in the hospital, as compared with the time following simultaneous bilateral ureteral transplantation, is approximately the same.

Ureterosigmoidostomy is indicated in cases of congenital abnormalities of the bladder or urethra in which total urinary incontinence exists, in extensive, irreparable vesicovaginal fistulas, and in certain selected cases of extensive carcinoma of the bladder. In the latter cases, the use of ureteral catheters in bilateral simultaneous transplantations may have a definite advantage in accepting the increased risk of one operative procedure rather than in dividing the operation into stages. This is a debatable point.

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PATHOLOGY OF BLADDER NECK OBSTRUCTION WITH PARTICULAR REFERENCE TO CYSTOSCOPIC PROSTATECTOMY*

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IT IS the purpose of this paper to describe the pathology of bladder neck obstruction with particular reference to correction of the obstruction by cystoscopic prostatectomy. The principles upon which relief of the obstruction by this method is based are discussed. The various forms of obstruction are considered separately with description of the gross pathology and the findings on cystoscopic and rectal examination. Mention is made of the suitability of each form for relief by transurethral methods.

RATIONALE OF RESECTION

The rationale of cystoscopic prostatectomy is based upon important clinical observations concerning changes in the obstructing prostate, the result of constant drainage of the bladder by suprapubic cystostomy or urethral catheter. It was shown that a shrinking and decrease in the size of the gland often followed a period of drainage. On rectal examination a markedly enlarged, swollen, spongy prostate was often transformed into a slightly enlarged firm structure. Cystoscopic examination of the vesical orifice before drainage showed marked intravesical projection and urethral intrusion of bulging lobes whose surfaces exhibited greatly increased vascularity. On examination of the same patient after a period of bladder drainage the intruding lobes had receded and their increased vascularity was no longer apparent. These regressive changes in the prostate were most marked when the drainage was by suprapubic cystostomy. In some cases prolonged drainage was followed by sufficient shrinking of the prostate to permit healing of the suprapubic wound and temporary return of normal urination.

These observations raised the question, would not removal of only the obstructing portion of the gland be followed by these same regressive changes in the unremoved portion and thus permanently restore bladder function? This question was partially answered by Young from his experience with his punch operation in cases of median bar and contracture. He, and later Caulk, showed that the removal of small pieces of tissue by punch instruments effectively corrected the obstruction in bars and contractures. It should be noted that all bars are not cicatricial, a number of them consisting largely of glandular hyperplasia. Caulk was so impressed by his results that he extended the use of his cautery punch to obstructions due to hypertrophy of the prostate. He demonstrated that in the cases where a small proportion of the total growth could be thus removed there was usually relief of the obstruction and with it shrinking of the remaining part of the gland. This work of Caulk established the fact that relief of all types of obstruction could be obtained by transurethral resection when removal of the obstructing tissue by means of his punch was technically feasible. His contention that radical enucleation by open operation was not necessary in such cases has been repeatedly borne out.

As a result of this experience and histologic studies of the changes referred to, Caulk believes that benign prostatic enlargement is a form of inflammatory hyperplasia and is not neoplastic. Among others who subscribe to this belief are Ewing, Green and Brooks. This question is of significance in comparing the prospect for permanent relief by resection with prospective relief by open operation. If the enlargement is not neoplastic, recurrence need not be expected when the obstructing tissue has been removed and relief probably will be permanent if an adequate resection has been made.

ADVANTAGES OF RESECTION

Cystoscopic prostatectomy is rapidly replacing major surgical removal in the treatment of bladder neck obstruction. Of a large series of reported cases, this method was found suitable in 90 per cent of cases. It is preferable to major surgery because of important advantages to the patient. These are, a smaller risk to life than can be assured by the most satisfactorily con-

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ducted perineal or suprapubic operation; the assurance of as good functional results; a shorter period of convalescence without the distress imposed by prolonged drainage of urine and slow healing of the wound; and a substantial saving to the patient's finances.

IMPORTANCE OF PREOPERATIVE DIAGNOSIS OF FORM AND POSITION OF OBSTRUCTION

Cystoscopic prostatectomy is a highly technical procedure and its proper performance depends upon accurate knowledge of the precise form and position of the obstructing lobes. It is not enough to merely establish the presence of residual urine and an enlarged prostate, often the extent of the investigation when suprapubic prostatectomy is performed. When transurethral methods are to be employed a thorough understanding of the gross morphologic character of the obstruction and proficiency with cystoscopic instruments are essential. The precise form that the prostate has taken and the portion of it responsible for the obstruction must be recognized through interpretation of the cystoscopic views. With this information, adequate and safe resection of the obstructing tissue may be undertaken.

CLASSIFICATION OF BLADDER NECK OBSTRUCTION

Any pathologic change in the structures of the vesical neck or in the innervation of its sphincters interfering with free passage of urine is a bladder neck obstruction. Obstructions are of two general types: (1) those due to disturbances of innervation of the bladder wall and sphincters, and (2) those due to actual pathologic change in the tissues of the vesical neck. In transurethral resection we are concerned only with obstructions due to pathologic changes in the tissues of the bladder neck. The various forms of obstructions in this group may be classified accordingly as they are benign, inflammatory or malignant. The classification is as follows:

I. Benign prostatic enlargement.
   - A. Bilateral lobe enlargement.
   - B. Solitary posterior commissural enlargement (mid-lobe).
   - C. Solitary subcervical lobe enlargement (pedunculated mid-lobe).
   - D. Bilateral and posterior commissural enlargement.
   - E. Bilateral and subcervical lobe enlargement.
   - F. Bilateral, posterior commissural and subcervical enlargement.
   - G. Anterior lobe enlargement.

II. Median bar and contracture of the vesical neck.

III. Carcinoma of the prostate.

BENIGN PROSTATIC ENLARGEMENT

Benign prostatic enlargement, in one of its various forms, is found in approximately 70 per cent of cases of obstruction. The condition is either an adenomatous or an inflammatory hyperplasia of the prostate, characterized by an arrangement into one or more lobes. Enlargement of the gland may produce lateral lobes, posterior commissural enlargements, subcervical lobes and anterior lobes separately or in combination.

SOLITARY FORMS OF BENIGN ENLARGEMENTS

Bilateral lobe enlargement is a frequent form of obstruction. In the usual case there are symmetrical intra-urethral enlargements of the two lateral lobes with compression of the prostatic urethra. Greater enlargement may occur in one lobe with displacement of the prostatic urethra toward the opposite side. In one group of cases the enlargement is confined to the prostatic urethra. In another group the internal sphincter dilates allowing upward or intra-vesical enlargement of the lateral lobes. In this group there may be considerable upward projection with elongation of the prostatic urethra. On rectal examination in either group the prostate is enlarged, smooth, of rubbery consistency with a median furrow palpable and a deep sulcus on either side between the periphery of the gland and the pubic arch. Cystoscopically deep clefts are seen in the anterior and posterior positions running well down into the urethra. When intravesical enlargement is present, adjacent zones of bladder wall are obscured by the projecting lobes and there is elongation of the prostatic urethra. This form of obstruction usually is well suited for cystoscopic prostatectomy (Fig. 1). The intruding portions of the lateral lobes are resected, beginning above at the base of the gland and continuing down into the urethra as far as the verumontanum. Contraindications to cystoscopic prostatectomy are occasionally found in this form of obstruction. These are present when the intravesical projection of the lateral lobes is so great that it is impossible to see over them

with the operating telescope, or when the prostate is spongy and vascular, causing it to bleed briskly on the slightest instrumentation, thus obscuring vision. Very occasionally there is marked

Fig. 1. Bilateral Lobe Enlargement. (From Randall, Surg. Path., Prostatic Obstructions.)
This form of obstruction is readily relieved by cystoscopic prostatectomy. The portions of lateral lobes bulging into the urethra are resected, beginning above at the base and continuing down to the level of the verumontanum.

compression and deformity of the urethra and it may be impossible to pass the instrument.

Solitary posterior commissural enlargement, often called mid-lobe or glandular bar, is another frequent form of obstruction due to benign enlargement. The enlargement originates in prostatic tissue connecting the lateral lobes in the floor of the urethra immediately under the muscles of the posterior vesical lip. When the growth is small there is merely elevation of the posterior vesical lip. When large there is marked intravesical projection with the trigone almost entirely obscured. The enlargement early resists the action of the trigone muscle and there is great hypertrophy of this structure. Difficulty in starting the stream is an early and constant complaint in patients with this form of obstruction. Marked hypertrophy of the bladder wall is common and diverticulum formation is not infrequent. Rectal examination is often misleading when no enlargement of the lateral lobes is present. The mid-lobe may not be palpable even though considerably enlarged. On cystoscopy, forward projection and elevation of the posterior vesical lip by a rounded growth is noted. Clefts are found in the right and left posterolateral positions running down into the urethra and merging together in midline. Hypertrophy of the trigone is marked. In advanced cases this structure is often entirely hidden from the view obtained through the right angle vision observing telescope. Cystoscopic prostatectomy is an ideal procedure for this form of obstruction (Fig. 2). The obstructing tissue between the two clefts is resected until the trigone is entirely visible.

Obstruction may be due to enlargement of the subcervical or Albarran glands. These glands form a small group in the floor of the prostatic urethra in midline between the posterior vesical lip and the verumontanum. They are just below the mucosa, and enlargement of them results in a rounded nodule with a narrow pedicle—the so-called pedunculated mid-lobe. Growth is always upward through the sphincter with the formation of a ball valve which closes the internal vesical orifice during voiding. Rectal examination is usually unsatisfactory since an enlarged subcervical lobe is often not palpable. The diagnosis of this form of obstruction is readily made at cystoscopy. View of the pedicle of the subcervical lobe is best obtained by use of a forward vision telescope (Fig. 3). The pedicle is severed and the lobe easily removed by cystoscopic prostatectomy.

COMBINED FORMS OF BENIGN ENLARGEMENT

Each of these forms of benign prostatic enlargement may occur in combination with another form. Combined forms of enlargement commonly found are bilateral lobe and mid-lobe, bilateral lobe and pedunculated mid-lobe and occasionally bilateral lobe, mid-lobe and pedunculated mid-lobe.

In obstructions due to the combined enlargement of the lateral lobes and the posterior commissure, enlargement in the posterior comissure leads to dilatation of the internal vesical sphincter and permits upward growth of the lateral lobes. In advanced cases there is marked intravesical projection with elongation of the prostatic urethra. At rectal examination the upward direction of the enlargement is apparent, differing in this respect from the downward and backward growth commonly found in pure bilobar enlargement. At cystoscopic examination a deep

cleft separating the lateral lobes is found in mid-position anteriorly, and clefts are found in the right and left postero-lateral positions between the median and lateral lobes. The degree of elongation of the prostatic urethra varies with the stage of the growth. At cystoscopic prostatectomy the posterior commissure is resected first, followed by resection of sufficient portions of the lateral lobes to provide a wide funnel-shaped opening. Marked intravesical projection of the lateral lobes and a spongy vascular gland may be encountered in this type of obstruction and prove to be contraindications for cystoscopic prostatectomy.

In combined bilateral lobe and subcervical lobe enlargement pathologically there is the usual bilateral lobe enlargement plus a pedunculated mid-lobe. Here again upward growth of the subcervical lobe causes dilatation of the internal sphincter with marked intravesical enlargement of the lateral lobes in advanced cases. On rectal examination the upward enlargement of the laterals is suggested. Cystoscopically there is the usual anterior cleft and deep clefts in right and left posterolateral positions. With the foroblique and retrospective telescope the pedunculated mid-lobe is seen projecting into the bladder. Removal of the obstruction by cystoscopic prostatectomy is accomplished by complete resection of the pedunculated mid-lobe and obstructing portions of the lateral lobes.

When obstruction is due to the combination of bilateral lobe, posterior commissural and subcervical lobe enlargement, there is intra-urethral and intravesical enlargement of the lateral lobes and upward growth of the posterior commissure with the trigone obscured to some degree. Added to this there is a pedunculated mid-lobe projecting upward through the internal vesical orifice. The presence of this form of obstruction is recognized at cystoscopy in the manner described above. The obstruction usually is readily removed by cystoscopic prostatectomy, except in occasional cases exhibiting contraindications to the method mentioned above. The pedunculated mid-lobe and posterior commissure are resected

Fig. 2. Posterior Commissural Enlargement (mid-lobe). (From Randall.)
Cystoscopic prostatectomy is an ideal procedure for this form. Sufficient tissue is resected from the posterior commissure until the entire trigone is clearly visible.

Fig. 3. Solitary Subcervical Enlargement (pedunculated mid-lobe). From Randall.)
Relief of obstruction is readily accomplished by severing the pedicle of the lobe and removing it transurethrally.

first, followed by removal of sufficient tissue from the lateral lobes to provide a wide open vesical neck and prostatic urethra.

Anterior lobe enlargement is the rarest form of prostatic enlargement, and is an infrequent cause of obstruction. Hyperplasia in this location is uncommon because glandular tissue of the anterior commissure is rarely present past puberty. The hypertrophy is usually small and may be found in combination with lateral lobes. Its presence is recognized at cystoscopy by the finding of clefts in the right and left anterior oblique positions. The growth should be easily removed by cystoscopic prostatectomy.

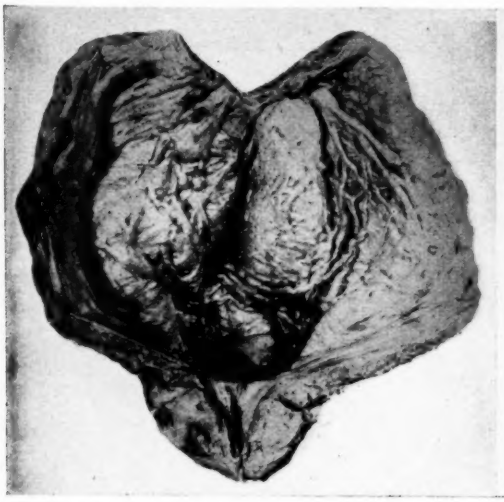

Fig. 4. Median Bar. (From Randall.)
This form of obstruction is relieved by resecting the forward projecting mass until the normal curve between the trigone and verumontanum is restored.

Fig. 5. Carcinoma of Prostate. (From Randall.)
Obstruction is relieved by resecting the obstructing tissue in the posterior and lateral quadrants, providing a wide funnel-shaped prostatic urethra.

MEDIAN BAR AND CONTRACTURE

Obstructions may be due to inflammatory changes in the prostate and tissues of the vesical neck, the result of long continued infection. These changes are characterized by replacement of the glandular and muscular structures with fibrous tissue. In the usual case the process is most marked in the tissues beneath the posterior quadrant of the vesical neck with the formation of a median bar. In advanced cases the changes occur throughout the prostate with general contraction of the gland, narrowing of the entire prostatic urethra, and fixation of the vesical neck. When the condition has reached this stage it is called contracture of the bladder neck. Median bar and contracture often occur in very young individuals but are more commonly found in men over forty. In many of the cases a history is obtained of a previous gonorrheal urethritis and extension of the infection to the posterior urethra and prostate. A study of the gross pathology of the obstructions due to the formation of a median bar shows a dense inelastic mass of forward projecting tissue forming the posterior quadrant of the vesical neck. The bar causes elevation of the posterior quadrant and the forepart of the trigone. Immediately below the bar the urethra falls away sharply and the verumontanum is drawn upward by the sclerotic process. On cut section the bar is composed of fibrous tissue and a small amount of muscular tissue with glandular tissue absent. Marked hypertrophy of the bladder wall and trigone are usually present and bladder stone and diverticulum formation are occasionally found associated. On rectal examination the prostate is usually of normal size but of firm consistency. With a sound in the urethra an increased thickness and firmness of the tissues at the bladder neck may be evident on rectal palpation. Diagnosis of ob-

struction due to median bar or contracture is made only on cystoscopic examination. Since there is no enlargement of the lateral lobes no clefts are seen on examination of the bladder neck. The sharp forward projection of the posterior vesical lip and elevation of the forepart of the trigone are visible. Except in advanced cases with general contracture the prostatic urethra falls away immediately below the bar and is quite roomy. Upward displacement of the verumontanum may be noted. This condition is ideally suited for cystoscopic prostatectomy (Fig. 4). The forward projecting mass is resected, restoring the normal curve between the trigone and the verumontanum. Relief of the obstruction may also be accomplished by use of one of the punch instruments.

CARCINOMA

In another group of cases the obstruction is due to carcinoma of the prostate, when, unfortunately, obstruction occurs only after the malignant changes are advanced. In most of the cases there is extension of the disease to the bladder base, seminal vesicles and neighboring lymphatic glands. In this advanced stage, cure of the disease by radical removal of the prostate by perineal operation is out of the question and the surgeon's only purpose is to provide comfort to the patient during the remainder of his life by the relief of the urinary obstruction, through cystoscopic prostatectomy. Pathologically the chief feature of the obstruction in these cases is the loss of elasticity and extreme fixation of the structures of the vesical neck. Narrowing of the prostatic urethra is common. When upward extension occurs there is involvement of the bladder submucosa and muscularis and nodular projections are found on the bladder base covered with intact mucosa. Not infrequently carcinoma is found associated with benign prostatic hypertrophy. In these cases a small area of adeno-carcinoma is found on making careful sections of a lateral lobe. Rectal examinations usually shows some degree of enlargement of the prostate with stony hardness and irregularity of its surface the outstanding characteristics. In early cases a single stony hard nodule may be the only finding with the remainder of the prostate normal. Such cases present excellent chances for cure of the disease and should be submitted at once to radical removal of the prostate by perineal operation. In advanced cases there is a broad hard irregular mass of tissue occupying the prostatic fossa extending upward toward the bladder base and seminal vesicles, with obliteration of the median furrow and filling in of the lateral pubo-prostatic sulci. Cystoscopic examination shows a firm fixed narrowed prostatic urethra. The vesical margin is usually irregular with small projections often visible. Examination of the bladder shows trabeculation and hypertrophy of the trigone. When upward extension of the growth has occurred, flat nodules are seen on the bladder base and occasionally a large projecting mass is found. Cystoscopic prostatectomy as mentioned above is strictly a palliative procedure in carcinoma of the prostate and its employment is limited to cases with obstruction (Fig. 5). The obstructing tissue in the posterior and lateral quadrants is resected and a wide-funnel-shaped prostatic urethra obtained. Deformity and narrowing of the prostatic urethra are occasionally present in carcinoma and passage of the instrument is impossible.

In conclusion the following should be emphasized. Regressive changes following bladder drainage alone occasionally permit the return of normal urination. Restoration of bladder function in these cases is only temporary, since the intruding tissue responsible for the obstruction is still present and will continue to interfere with urination, eventually setting into motion the same processes leading to obstruction of the bladder. The objective of transurethral resection is to prevent such an occurrence by removal of the potential obstruction. The difference between enucleation and transurethral resection is only one of degree; neither is a complete prostatectomy. The lobular hypertrophied mass compresses the rest of the gland toward its periphery. Enucleation removes the lobular hypertrophied mass, leaving the surrounding compressed prostatic tissue. The urologic surgeon trained in cystoscopic resection need only consider enucleation of the prostate by open surgery when contraindications for cystoscopic prostatectomy are present. Transurethral methods should be employed in every case of obstruction due to median bar or contracture. In carcinoma with obstruction it is the best palliative procedure at our disposal and provides comfort to the patient through relief of the urinary obstruction.

LITHOLAPAXY

A NEGLECTED OR FORGOTTEN PROCEDURE

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THE constant changes that are taking place in the field of surgery necessitate a revision of our views on various technical procedures. Oftentimes a slight change in chemistry or physics renders a procedure useful and workable which previously had been dangerous and useless. Pitkin's recognition of the importance of the specific gravity of spinal anesthetics, re-popularized a wonderful method of anesthesia which had been discarded as dangerous twenty-five years ago. A new change in the chemistry of the iodides resulted in uroselectan and skiodan for intravenous pyelography after Rountree had tried and discarded sodium iodide as an intravenous pyelographic medium because of the indistinct shadows produced. The use of Lugol's solution in the preoperative preparation of patients with goiter, the use of phenoltetraiodophthalein as a test of liver function and for rendering the gallbladder refractive to the roentgen ray, are the result of slight changes which have had far-reaching effects. Innumerable instances could be cited along the same line.

In the past nine years, transurethral prostatic resection has been developed. Previous to 1923, a certain few selected cases were subjected to cystoscopic prostatectomy. These cases comprised the group of hypertrophies in which the median lobe of the prostate was causing the obstruction and it was removed by the so-called "punch operation" using instruments devised by Young, Braasch and Caulk. In 1923 and 1924, the field of selection in these cases was gradually widened and some lateral lobe obstructions were successfully removed. This impetus resulted in the development of many different types of instruments for the excision of the hypertrophied prostate; McCarthy, Davis, Bumpus, Kerwin, Caulk, Foley, and others invented very ingenious instruments for accomplishing this resection. Only time will tell which instrument is the best and the simplest. Suffice it to say that at present any instrument which satisfactorily removes the obstruction and controls post-operative hemorrhage accomplishes the desired result.

We think that it may be stated, without fear of serious contradiction by one familiar with the method, that transurethral prostatic resection is here to stay and that 90 per cent of all cases of prostatic hypertrophy can be handled by this method. It is probably the greatest advance made in surgery in the past decade.

This development will naturally affect the methods used in handling conditions frequently associated with retention due to prostatic hypertrophy. Approximately 4 to 5 per cent of all patients with prostatic hypertrophy have bladder stones. This complication no doubt will be cited as one of the contra-indications to transurethral prostatic resection. In our opinion such is not the case. In 1878 Bigelow described a lithotrite. Prior to that time litholapaxy was more or less deprecated, principally because of the attendant difficulties in removing the fragments of stone after crushing. Bigelow also developed an evacuator which overcame this difficulty, and the procedure received due recognition and came into popular use. However, in spite of its efficiency, with the development of asepsis and the attendant development of surgery, suprapubic cystostomy became the method of choice to the extent that now the mention of lithotrite or the procedure of litholapaxy is met with interrogations as to just what is meant by these terms. The demonstration of the lithotrite provokes amazement and almost incredulity in practically all members of the medical profession, not excepting urologists who limit their practice to diseases of the genito-urinary tract.

The instrument today is practically identical with the instrument described by Bigelow (Fig. 1). No changes or improvements have been made which are of any importance and we believe that any inventor whose instrument has

withstood the test of time for fifty-four years in our rapidly changing surgical world should not be forgotten. The instrument must be seen to be appreciated. Its crushing end is shaped

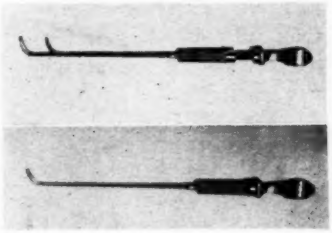

Fig. 1. Bigelow lithotrite with jaws opened and closed.

roughly like an ordinary metal urethral sound except that the "shoe" portion comprises two blades, a female and a male portion. The male blade is movable in a slot and its fenestrated margin engages the female blade between which the stones are crushed. A lock and screw arrangement are placed in the handle of the lithotrite for obtaining great pressure and leverage in crushing the stones. The fragments are washed out through the cystoscope instead of the Bigelow evacuator.

Crenshaw in 1923 reported 153 cases of bladder stone removed by litholapaxy. He includes in his list of contraindications to this procedure, the presence of prostatic hypertrophy, bladder tumor, diverticulum or other complications which necessitate cystostomy following the removal of the stone. Of this group prostatic hypertrophy is by far the commonest. With the development of transurethral prostatic resection, prostatic hypertrophies are no longer *per se* a contraindication to litholapaxy because now the stones can be crushed and removed and the obstructing prostatic tissue can be removed later cystoscopically.

So we wish to call the attention of the profession to a neglected or forgotten instrument, namely the lithotrite, which should never have been neglected or forgotten, and remind them that it is just as useful and efficient now as it was fifty years ago, and also we wish to make the point that bladder stones *per se* are no contraindication to the procedure of cystoscopic prostatectomy. Under spinal anesthesia the lithotrite can be inserted, the stones crushed, and removed. Then an indwelling catheter can be inserted and the patient can be prepared for transurethral prostatic resection just as when no stones are present. When the general condition of the patient has become satisfactory as determined by phthalein, blood chemistry and degree of infection, the obstructing prostatic tissue may be removed with any of the various types of instruments according to the preference of the operator.

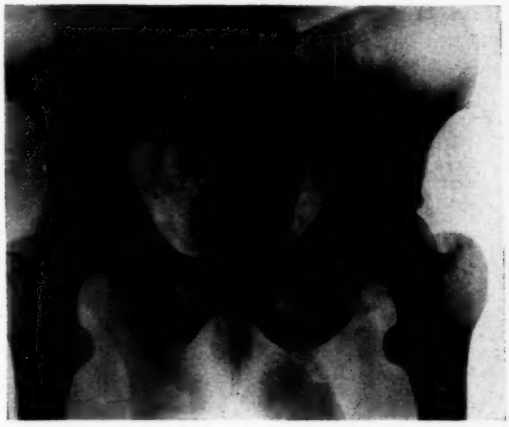

Fig. 2. Roentgenogram of a patient with a large bladder stone and multiple prostatic stones. This stone was crushed with a lithrotite and the fragments removed through a cystoscope.

In conclusion it might be well to enumerate the contraindications laid down by Crenshaw in 1923. With the exception of prostatic hypertrophy they are as follows:

1. A stone of such large size that the jaws of a lithotrite will not embrace it.

2. A stone so nearly filling a contracted or deformed bladder that the lithotrite jaws cannot be opened.

3. Prostatic hypertrophy, bladder tumor, diverticulum, or other complications which would necessitate cystotomy following the removal of the stone. In cases of prostatic hypertrophy and vesical calculus in which there is some contraindication to cystostomy, litholapaxy can usually be performed under sacral or general anesthesia in spite of the prostatic obstruction. There are many cases, also, where a small prostatic hypertrophy is increased in size by the congestion due to the bladder stone and all residual urine and symptoms will disappear following the removal of the stone; this type of case should unques-

tionably have a litholapaxy. Stones in a deep diverticulum with narrow orifice require cystostomy, while those in shallow pockets can often be crushed and the pocket opened widely into the bladder by fulgurating the orifice.

4. If the nucleus of the stone is known to be of such physical character that it cannot be readily freed from the lithotrite, unless the operator is prepared, if necessary, to perform a cystostomy at the same place and time.

5. If a stone is attached to the bladder wall, and if any operation has previously been performed on the bladder or adjacent structures.

6. Stones with a sharp foreign body, such as a hairpin or knife blade, as a nucleus, unless proved on cystostomy to be free in the bladder.

UROLOGY IN MIDDLE EUROPE

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Minneapolis

ONE who visits the clinics of Middle Europe necessarily starts with certain fixed impressions. The abundant comment in our periodicals upon the unhappy conditions in Germany and Austria leads one to expect dilapidated hospitals and inadequate equipment, balanced only by the skill and brilliance of the professors. The able professors are there, but dilapidation and inadequacy are not. Germany and Austria are feeling the pangs of poverty, but they are struggling successfully to provide adequate medical care for their citizens.

How is this done? In Germany, citizens having monthly incomes below one hundred dollars are required to belong to the Krankenkasse or health insurance society. Ordinary care is furnished these patients (about 80 per cent of the population) by panel physicians at a very small monthly sum per patient. If hospitalization is required, these practitioners refer the individual to an approved hospital where the insurance company pays hospital expenses but no physicians' fees.

Roughly, 10 per cent of the population consult private doctors on the same basis as in the United States. Another 10 per cent cannot pay even the Krankenkasse premiums, and are cared for by charitable organizations.

There is some grumbling among the insurance patients, but in the main they are well satisfied—which is easily understood when one sees how long they remain in the hospitals, what good care they receive, and how often they go from the hospital to a "cure" in the mountains or at the seaside at the company's expense. The physician is the loser in this system, since his fees are pitifully inadequate.

TYPES OF HOSPITALS

The present system of medical care in Germany has been adapted to pre-existing facilities without the construction of clinics or hospitals by the insurance companies.

The University Clinic is the principal unit in German medicine. It consists of a number of sub-clinics, one for each of the major specialties, *i.e.*, Surgery, Gynecology and Obstetrics, Medicine, Eye, Ear, Nose and Throat, and at times other surgical specialties such as Urology or Orthopedics. Each of these clinics is an independent organization ruled over with absolute powers by the chief. He is appointed by the University but is apparently subjected to but few restrictions. This system leads to considerable duplication of laboratory and x-ray facilities. While the method may strike one as a waste of money for a country which is in bad financial condition, the Germans feel that it tends to turn out more competent specialists, since the surgeon must of necessity receive a broad training in order to care for all non-surgical complications which may develop in his patients, and in order to make his own diagnoses quite unaided. Thus a German surgeon is well-versed in x-ray, Internal Medicine, Neurology, and in many other fields.

The hospitals belonging to these clinics are large, well-equipped, and well-staffed.

The large cities usually have their own mu-

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nicipal hospitals, which in many cases are also divided into semi-independent units for the various specialties. An outstanding example of this type of institution is the Städtisches Krankenhaus at Frankfort-am-Main, with Schmieden in charge of Surgery and Volhard at the head of Medicine.

A third type of hospital is owned by some physician and has its parallel in this country.

The fourth large group consists of hospitals supported by institutions such as Catholic Sisterhoods or other Church organizations. To my mind the outstanding institution of this type in Germany is St. Hedwig's in Berlin.

ORGANIZATION WITHIN THE CLINICS

Germany is still a country of titles. In a place in which the druggist's wife is Frau Apotheke and the wife of the head-waiter is Frau Direktor to her social acquaintances, one expects to find an array of titles—and does. After completing certain prescribed work at a University Clinic, the graduate receives the title "Privat-dozent" which he retains for life or until appointed Professor. The latter title is also permanent. Neither implies an active University position.

Within the Clinic, the chief is usually a Professor (whether in a University, a municipal, an institutional, or a private clinic). His first assistant and personal representative is the Oberarzt. Beneath him are the assistentäerzte and volontäeraerzte.

The assistants correspond to our internes, residents, and fellowship men. Volunteers may serve merely as observers, or they may work as assistants. The chief of a German surgical clinic possesses absolute powers over his domain that are probably not equalled by those of any monarchs now ruling.

Because of the economic depression and the surplus of physicians, assistants remain in the clinics for many years, and men of outstanding ability usually retain their clinic appointments rather than go into independent private practice. As a result, there is an oversupply of assistants, Sauerbruch, for example, having five assistants as well as two nurses scrubbed for every operation.

The German medical societies have themselves prescribed certain requirements, including place and length of training and an examination as to proficiency, which must be met before a graduate may use the title of specialist. In Urology, for example, this includes a minimum of two years at an approved clinic as well as certain preliminary training in general surgery. The societies seem quite able to enforce this rule without government aid, at the same time protecting themselves and the laity against the "six weeks specialist." It is to be hoped that the American medical profession will in the future adopt some such effective measures for controlling those who profess to be specially trained.

UROLOGICAL CLINICS

Four main types exist. The first is the general surgical clinic without special provision for urological patients. Cystoscopic equipment is rather inadequate and the excellence of the care depends upon the interest which the chief feels in such cases.

In the second type, there are beds set aside for urological cases, usually in charge of an assistant who rotates upon the various services. If the chief is especially interested in urology, or if the service falls into the hands of an interested and competent assistant, urological work may be exceedingly well done. The best examples of clinics of this type are those of Voelcker at Halle, of Wildbolz at Bern, and of Schmieden at Frankfurt. At the last-named place, the work has reached a high stage of excellence under Sebenning, who is equally interested in General Surgery.

The third type is the outpatient clinic without access to hospital facilities of its own. This is typified by the organization of Joseph in Berlin. It is amazing to see in these clinics how much in the way of operative cystoscopy can be done in the outpatient clinic.

The fourth type is that in which the urological division is an independent unit, distinctly not subsidiary to any other, and headed by a chief who limits himself to Urology.

The outstanding example of this type of organization is the clinic of Professor A. von Lichtenberg at St. Hedwig-Krankenhaus in Berlin. His service, on which the writer was privileged to spend five months as a volunteer, consists of more than 200 beds in a general hospital, but is quite independent of the surgical and medical services, which contain some 600 beds. X-ray and laboratories are shared with the other departments, but there is a separate operating and cystoscopic suite for Urology.

The clinic is entirely the product of the efforts

of Professor von Lichtenberg, who has built it up in a remarkably short time from very modest beginnings. He is known to every urologist for his work in the development of retrograde pyelography (with Voelcker in 1906), as one of the editors of and contributors to the "Handbuch der Urologie," undoubtedly the outstanding text and reference book of Urology today, and for his important part in the development of successful intravenous urography (1929-Uroselectan).

His affability and personal charm have undoubtedly played an equal role with his great energy and ability in his success. The presence of an able American assistant, Dr. P. B. Hughes, enables the visitor who speaks only English to profit fully from a visit to the clinic. His German assistants, particularly Oberarzt Heckenbach, are well trained, friendly, and helpful to visitors who speak the language.

In spite of the large size of the clinic, the Professor is intimately acquainted with the condition of each patient. Arriving daily at eight, he views the films of the previous day, then makes rounds with his assistants, stopping to see every case. At eleven, cystoscopies are begun. At two the scheduled work of the clinic is complete and the Professor is free for his studies. On Tuesday and Friday ward rounds are deferred until after the operations are over. Working in one room, he often operates upon eight or ten cases before one o'clock. His daily personal supervision of so large a group of patients is made possible by the careful training of the assistants and the delegation of responsibility to them so that no time is lost in making the visits.

The two chief interests of the clinic are in intravenous urography and in conservative surgery of the kidney. The cases are so well selected by the referring physicians that it is rare to see a patient who does not present a definite urological lesion. Kidney disease predominates in the form of stone, pyelonephritis, tuberculosis, and tumor. Lower tract lesions are less common. Gonorrhea is rarely admitted to the clinic. There is no outpatient department, the patients being returned to the referring physician for the work usually done in the dispensary.

UROLOGICAL WORK

Cystoscopy and urography.—Cystoscopy is rather lightly regarded. Anesthesia is often omitted, and asepsis is variable. In some clinics the urethra is touched with dry cotton as the only preparation. In others, the parts are carefully cleansed. In von Lichtenberg's clinic cap, mask, and gloves are worn for cystoscopy. The German instruments are optically somewhat superior to ours, giving a larger field of vision and greater clarity, but mechanically are somewhat inferior.

Excretion urography has perhaps been rather overdone in Europe as here, but with a somewhat clearer realization of its limitations. It is worth noticing that in von Lichtenberg's clinic every patient who has an intravenous urogram is also subjected to cystoscopy. It is plain that in the clinic in which intravenous urography was made practicable, it is realized that the method does *not* yield adequate information about the bladder.

There is a growing tendency to limit excretion urography to three classes of cases: (1) those in which there is a faint suspicion of a kidney lesion (vague abdominal pain); (2) those in which retrograde pyelography is impossible or contraindicated; and (3) those in which it yields insufficient information (functional lesions).

We in this country should familiarize ourselves with the deficiencies of excretion urography in order that the general practitioner may not develop too much blind confidence in it. In two particular types of cases it will often fail, *i.e.*, in early, non-destructive renal tuberculosis, and in all but the most advanced neoplasms of the bladder.

The most popular agent is Uroselectan B (Neo-Iopax) because of the small quantity required and the good visualization. Abrodil (Skiodan) is also widely used, while Pelviren is just appearing. Uroselectan (Iopax) is practically abandoned.

Bilateral retrograde pyelograms are rarely made. Wildbolz is emphatic in condemning all retrograde pyelography in tuberculosis, fearing that it may cause pyelovenous backflow and the dissemination of bacilli into the systematic veins. In view of the high percentage of cases in which renal tuberculosis is associated with secondary lesions in the prostate and vesicles, and in view of the now well-known fact that urethral manipulations often release bacteria from these organs into the blood stream, I cannot believe that the danger of pyelography is greater than that of cystoscopy, at least in the male. Yet how but by

cystoscopy may we be sure that the sound side actually *is* sound?

Anesthesia.—There is a decided preference for regional and local anesthesia. The most noteworthy advances were found in the clinic of Kirschner (a general surgeon) in Tübingen. He induces local and regional anesthesia with a very dilute mixture of percaine with 0.5 per cent procaine, given through a pressure apparatus. Compressed CO_2 forces out the solution at a pressure of three atmospheres.* Administration is rapid (a few minutes), and the resultant anesthesia very satisfactory. With it I saw him perform thyroidectomy, radical mastectomy, resections of the stomach, cholecystectomy, excision of the rectum, closed reduction of fractures, and all the usual operations of surgery quite painlessly. For abdominal operations he supplements the local infiltration with splanchnic block with remarkable success.

Kirschner has also devised a type of spinal anesthesia by which he can produce a girdle of analgesia, leaving most of the lower extremity sensitive. This is accomplished by replacing a part of the spinal fluid with air, then elevating the hips. The air protects the lower roots from the anesthetic agent (percaine-starch), which floats upon the remaining spinal fluid. It is claimed for the method that the blood pressure is but little affected because the vasomotor nerves to the extremities are left intact. Both methods demand a thorough trial.

Paravertebral anesthesia is favored by many in spite of its one disadvantage in kidney surgery—dissection around and traction upon the pedicle is painful. This can be overcome by the use of gas during this stage of the operation, or a bilateral block can be induced by Kirschner's method, resulting, according to the latter, in complete anesthesia.

Von Lichtenberg has recently replaced paravertebral by the high epidural anesthesia of Dogliotti. Five c.c. of 1 per cent novocain are injected epidurally between the last dorsal and the first lumbar spines. If no anesthesia appears in five minutes, it is concluded that subarachnoid injection has been avoided, and 45 c.c. more are given. Complete anesthesia and relaxation are secured, but I am a little fearful of accidental subarachnoid injection and death from so large a dose of novocaine.

Spinal anesthesia is usually avoided as too dangerous. One gets the impression after seeing it used that the danger lies in the method of caring for the patient during the administration and operation, rather than in the method itself. Our own precautions with respect to the maintenance of the blood pressure, close observation, and the use of the Trendelenburg position are usually not observed. On the other hand, all these methods are used in conjunction with Kirschner's "girdle" anesthesia so that one wonders whether the manner of administration or the adjunct measures are responsible for the constancy of the blood pressure. I am of the impression that both are important.

Avertin is used almost entirely as a basal anesthetic, although Lexer (Munich) uses it combined with Narkophen for full anesthesia even in the upper abdomen and has found it quite safe in several hundred cases.

Intravenous anesthesia is also generally restricted to a basal level and supplemented by the volatile gases. Pernocton is thus used at the Rudolph Virchow Krankenhaus, apparently with great satisfaction.

Asepsis.—As in the United States, asepsis varies extremely. In one large clinic the Professor omits cap, mask, and gloves. Many omit cap and mask, while still more wear only cotton gloves, which seem to me more objectionable than bare hands. The custom of throwing soiled sponges upon the floor seems bad, but its effects are largely obviated by the almost universal wearing of galoshes by everyone who enters the operating theater. On the other hand, the common practice of reserving a separate operating room and often a separate pavilion for septic cases is superior to our own habit of doing both clean and infected cases is the same suite.

OPERATIVE TECHNIC

There are no striking differences between Middle European and American operative technic either in Urology or in General Surgery. One sees rough, careless, bloody surgeons and delicate, cautious, dexterous surgeons in about the same proportion as in the United States.

They have the same cleavage between those who advocate conservative kidney operations and

*This apparatus is very similar to that devised and used by Farr of Minneapolis as early as 1910.

those who condemn them as useless. The small group of perineal prostatectomists opposes the large group of suprapubic operators just as they do here.

It is a revelation to see the remarkable exposure that von Lichtenberg obtains by resecting the last rib and by dissecting carefully about the kidney.

Hydronephrosis.—Von Lichtenberg is an enthusiastic advocate of conservative operations for hydronephrosis. He resects the redundant portion of the pelvis, excises the strictured portion of the ureteropelvic juncture, and reimplants the ureter into a dependent portion of the pelvis. He emphasizes the need for fixation of the structures during healing (catheter splint and nephropexy) and for prolonged drainage (nephrostomy). He is inclined to favor this operation for patients with dilated pelvis and normal ureter, even in the absence of anatomic narrowing at the ureteropelvic juncture. Wildbolz has reported excellent late results from a similar operation.

For hydronephrosis due to narrowing of the intramural ureter or to stenosis of the meatus, von Lichtenberg widens the ureter by a silk stitch drawn through its wall above the point of stenosis by a Reverdin needle passed through the meatus from the bladder. The suture is brought out through the meatus and tied tightly. Widening occurs when it cuts through.

On the other hand many surgeons, among them Bachrach of Vienna, question the wisdom of conservative renal operations, feeling that nearly all patients subjected to them will ultimately come to nephrectomy.

Stone.—Nephrolithiasis is extremely common in Northern Germany, and equally rare in Southern Germany and Switzerland. This difference remains to be explained.

Goldberg has produced urinary stones in vitro in von Lichtenberg's clinic. He describes two colloids in the urine, one of which causes the aggregation of urinary salts into solid masses, while the second inhibits this aggregation. The precipitating colloid has been recovered from the blood and from the pelvic mucosa of patients suffering from nephrolithiasis. He believes that a deficiency of the second colloid leads to stone formation, but cannot yet explain the deficiency. The relative roles of infection, of obstruction, and of dietary factors remain in doubt.

The average urologist is inclined toward nephrectomy for unilateral stone with hydronephrosis, functional impairment, and a sound opposite kidney, but von Lichtenberg, impressed by the frequency of subsequent stone formation on the opposite side, urges conservatism. He removes the stone by pelviotomy, makes a decapsulation to interrupt the lymphatic connections with the colon, a nephropexy to encourage the formation of a collateral circulation, and a nephrostomy for drainage; he feels that his results justify the effort.

Ureteral stone is removed more often by operation and less often by manipulation than in this country.

Tuberculosis of the kidney, whether destruction has occurred or not, is regarded as strictly surgical if the other side is sound.

Pyelonephritis.—The medical therapy is practically standard. For coccic infections, small, repeated intravenous injections of neoarsphenamine (sulpharsphenamine intramuscularly or acetarsone by mouth if the veins are inaccessible). For bacillary infections, urotropine or its derivatives or some of the newer drugs such as hexylresorcinol or neotropine (similar to pyridium), Results are difficult to evaluate because of the tendency of the average case to run its course to recovery regardless of the form of therapy. For cases which become chronic and resist medical measures, von Lichtenberg uses the decapsulation-nephropexy-nephrostomy combination described above. His impression is that a great many patients recover after this operation (it is not done except as a last resort), but follow-up studies of a large series remain to be made.

Ureteral stricture has escaped the overemphasis which it has received in this country. It is not generally regarded as a clinical entity, but as a complication of some other disease, usually tuberculosis or an invasion by diseases of adjoining viscera.

Sympathectomy is regarded as still in the experimental stage. It has yielded interesting results in a few cases of chronic nephritis, but no opinion as to its real value is available.

Bladder tumors receive no uniform treatment. Suprapubic and cystoscopic fulguration are commonest. Joseph and his students treat nearly all cases by the cystoscopic application of trichloracetic acid. Although he claims a high percentage of cures in benign lesions and very satisfactory palliation in malignant ones even

when advanced, he has found few followers.

Segmental resection is regarded as the method of choice for localized, accessible carcinomata.

For localized carcinomata too extensive for resection or fulguration, Sebenning of Frankfurt makes ureterosigmoidostomy and excises the bladder. Although he has reduced the mortality of the operation to 20 per cent (50-90 per cent in most hands when done for carcinoma), the late mortality from infection is rather high. However, if the patient with an inoperable bladder tumor, than which there is no more distressing disease, can be given two or three years of cleanliness and comfort, no operation is too serious, nor any risk too high.

Radiation is but little used.

Bernhardt has used intravenous isamin blue at the Charité in Berlin for the treatment of inoperable cancer. The dye is taken up by the reactive connective tissue at the periphery of the tumor and stains it blue. In a few cases the drug apparently exerts some specific effect upon the tumor cells and causes them to regress. Work is being done in an attempt to combine isamin blue with radium salts in order to permit concentration of radium about tumors by intravenous injection.

It has occurred to the writer that isamin blue might also be used to delineate tumors, particularly in the bladder, as an aid to adequate operation.

Interstitial cystitis or Hunner ulcer is apparently much less frequent in Middle Europe than in the United States. When it occurs, it is equally resistant to treatment. In a case which resisted all conservative treatment Sebenning anastamosed a circular loop of ileum to an opening in the dome of the bladder to increase its capacity. Ten years later the patient is still symptom-free. The loop empties itself during urination both in this patient and in a number of dogs done more than a year ago. Serious infections have not developed.

While this is apparently rather heoric treatment, these are desperate cases, and this ingenious and original method merits a thorough trial.

Prostate.—The transurethral treatment of prostatic obstruction in Middle Europe has scarcely begun. With the exception of one or two men in Berlin who make forage of the gland by the method of Luys, I did not encounter anyone who operated in this manner. Von Lichtenberg has begun experiments with an instrument of his own, while Schwarz of Vienna uses the punch, but guides it with a finger in a suprapubic incision.

Suprapubic prostatectomy is the usual operation of election for prostatic hypertrophy, but a few, notably Wildbolz, use the perineal approach, Voelcker uses a method of his own, the ischiorectal, which does not appeal to me as particularly advantageous. Von Lichtenberg uses both suprapubic and perineal methods, reserving the latter for poor risks. It is to be regretted that the average urologist everywhere inclines to use one method for every case instead of attempting to adapt the method to the patient.

For the *inflammatory median bar* one sees a variety of procedures, all from above, including wedge excision, divulsion, and plastics in great variety. None yield uniform good results, so that one can be certain it is only a question of time before transurethral methods will be adopted.

In the *retention without incontinence* due to tabes dorsalis, Schwarz gives pilocarpine and measures the resultant bladder pressure. If it rises, he feels that the bladder muscle is still competent, and excises a piece of the internal sphincter with the punch. The results are good. I have no doubt that many such patients are living a needless catheter life in this country, and that our cases of "cord bladder" should be carefully reviewed to pick them up. One must recognize the possibilty, too, that in an individual with a lesion of the spinal cord and consequent detrusor weakness, a low grade prostatic enlargement which would ordinarily cause no trouble may lead to complete retention.

Prostatic carcinoma is regarded very pessimistically. In most clinics the attitude is: no obstruction, no treatment; for obstruction, the catheter or cystostomy. Radium is practically unused, probably partly because of the economic situation. They do not seem to share the optimistic view of the writer that much of value may be done with palliative operations.

RESEARCH

The attitude toward medical research in Central Europe differs somewhat from our own. Interest in it is more general. It reaches at times clear to the general practitioner who may even

spend his vacation in clinical investigation. It tends more in that direction, at least in Urology, but the laboratory side is not neglected even though the facilities for experimental work are smaller than our own. Except for a few large institutions, the buildings and equipment for this purpose are poor.

But consider what part of Urology we owe to the Germans and Austrians, to whom each case appears to present possibilities for research. Nitze and cystoscopy; Simon and nephrectomy; Wilms and Grawitz and renal tumors; Israel and renal carbuncle; Voelcker and von Lictenberg and pyelography; and von Lichtenberg and intravenous urography, to mention only a few. Research on the clinical side is almost a routine affair.

CONCLUSION

Why a trip to European clinics? From the urological point of view, such a trip is rather for the man who has had his fundamental training than for him who seeks it. The fundamentals are best acquired in this country where there are no language difficulties and where there is less overcrowding. The conscientious man who goes abroad hoping to secure an adequate training in a year will be disappointed. True, he can go to Vienna and listen to some of the best-known men in their line, as Blum, Rubritius, Hryntschak, Croiss, Schwarz, and Bachrach undoubtedly are. But the practical side—that of making the diagnosis and of governing or carrying out the treatment under supervision—will be lacking. It takes more than lectures to make a capable practitioner.

In addition, the German system of teaching by example over long periods—really the apprenticeship system—makes learning in a clinic slow. One must overcome a certain amount of almost unconscious antagonism against the foreigner—it amounts only to man's natural tendency to give preference to his own countrymen. I should estimate three years as the minimum time for a urological training in Germany—and then that training will be superior in the fundamentals but inadequate in some of the finer points, as operative cystoscopy.

On the other hand, one who has had his fundamental training cannot fail to gain by contact with men whose background differs so sharply from his own, yet whose professional problems are so similar. Also the opportunity to convert the great names of urology into mental images is of immense value. Both stimulate the mental processes.

Both types will benefit from contact with a foreign language and foreign customs. One cannot be long in Germany or Austria without becoming familiar with a different mode of life and thought. The constant political discussions will stimulate a healthy interest in one's own politics; the crossing of customs borders brings gratitude for the unity of interest in America; the various coinage systems improve one's ability for quick calculation; in brief, such a journey increases one's appreciation and enjoyment of his work, and particularly of his country.

CASE REPORTS

AVULSION OF FLEXOR PROFUNDUS DIGITORUM

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Duluth

On the afternoon of July 30, 1928, a man aged forty-two walked into my office with his left index finger wrapped up in an improvised bandage and asked for a dressing. The terminal phalanx of the finger was missing. He stated that earlier in the afternoon, while he was working as a laborer helping to unload hay into a barn, the finger became entangled in the block and tackle used for handling the hay, and he was pulled upward until his body was finally off the ground. He struggled to free himself, and, in doing so, the terminal phalanx of the finger was torn off. The finger presented merely a ragged wound—a stump end, and this was dressed with a simple surgical dressing. As I finished tying the bandage, he drew from his pocket the avulsed end of his finger, but to it was attached the whole tendon of the flexor profundus digitorum—thirteen inches in length, a photograph of which accompanies this report. The tendon had been pulled from

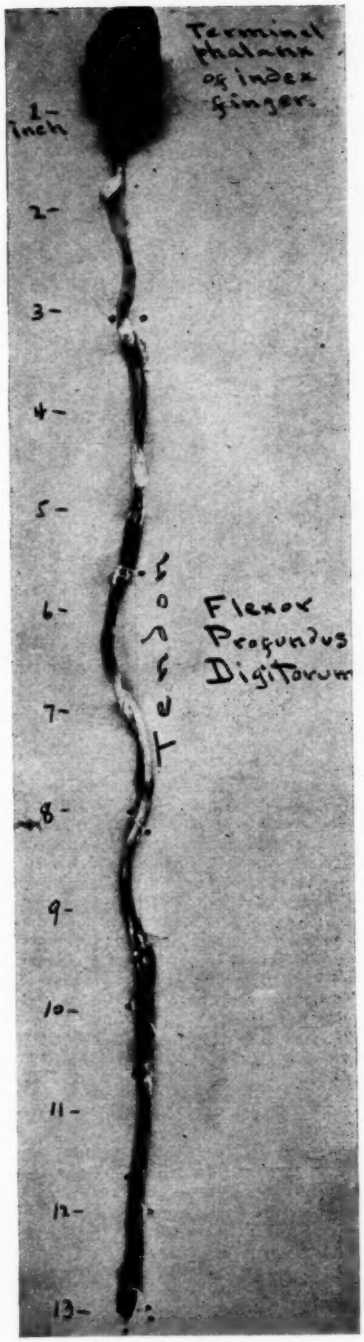

Fig. 1. Dr. Collins' case.

its muscular attachment in the forearm and slipped out of its sheath so neatly that only a few very short muscle fibers were clinging to the proximal end of the tendon. The wound healed per primam and his flexor function of the finger stump was practically unaltered.

ISOLATED FRACTURE OF THE LESSER TUBEROSITY OF THE HUMERUS

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Very little is found in the literature and standard textbooks on fracture of the lesser tuberosity of the humerus. Only one complete report by Lorenz[3] of this fracture was located; mention is made by Santee[4] of two cases, both of which were associated with posterior dislocation of the shoulder joint. In view of these facts, it has been deemed worth while to report a case of isolated fracture of the lesser tuberosity of the humerus, including accurate description of the accident, x-rays, treatment and resulting disability.

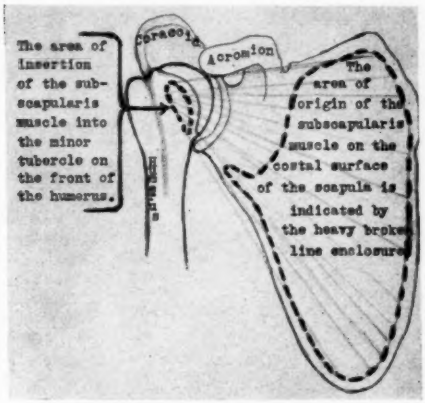

Fig. 1. Anterior view of the humerus and scapula showing the origin and insertion of the Mm. subscapularis with converging lines indicating the course of the fibers of this muscle.

The fracture considered in this report is of the evulsion type, as was that of Lorenz. The lesser tuberosity of the humerus is the main point of insertion of the subscapularis muscle, and these relations are shown by Figure 1. With this in mind it is a reasonable inference that sudden strong contraction of these muscle fibers could cause such an isolated evulsion fracture of the lesser tuberosity. The position of my patient's arm and that of Lorenz's patient were similar and puts the subscapularis muscle in a state of contraction conducive to pulling off the lesser tubercle. In this position the arm was at about 90 degrees with the trunk at the shoulder, adducted, and rotated outward, the elbow strongly flexed, the hand above the head, and the palm upward with the wrist extended. Visualization of this posture is aided by imagining the upper extremity of a waiter carrying a food tray, for it is essentially the same as assumed by the two victims of this injury. Held this way, the upper extremity is in a position of protection to parry the strength of the anticipated blow, in Lorenz's patient the blow of a falling heavy iron column and in my patient the forceful impact against the cement floor. In each instance this blow caused a sudden forced outward rotation of the upper arm and in each patient was accompanied at the same instant by an audible crack and severe pain in the shoulder. This last forceful outward rotation of the upper arm results in a final sudden severe stress of the already stretched fibers of the subscapularis muscle and also in the evulsion of the lesser tuberosity of the humerus. Posterior

dislocation of the shoulder as observed by Santee[4] and Jossel[3] in their patients no doubt accentuates the force exerted upon the stretched muscle fibers and the tuberosity as well.

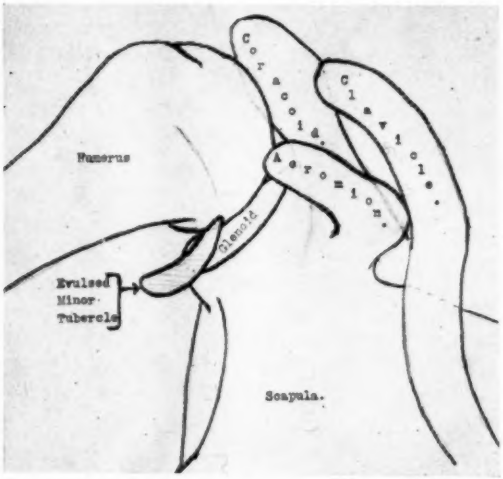

Fig. 2. Exact tracing of one of the stereoroentgenograms showing position of the evulsed tuberosity.

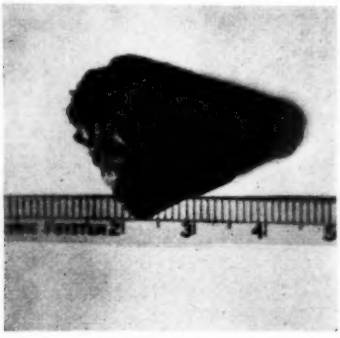

Fig. 3. Photograph of the removed tuberosity of the humerus.

The accident sustained by my patient was a fall, head-first down a ten-foot elevator shaft. This happened on March 9, 1926, when the patient, S. B., was thirty-two years old. He was brought to his doctor within an hour after the accident. The injured shoulder was swollen, red, and painful. Stereo-ray plates made at this time revealed no dislocation or other injury to the bones or joints except the evulsion of the lesser tuberosity as shown by Figure 2, a tracing of one of the stereoroentgenograms. The loose tuberosity is seen displaced well down along the side of the rim of the glenoid cavity.

Manipulative efforts to replace the tuberosity were not successful and a body swathe and Jones' sling were applied. After one week active motion was started but was limited in all directions. After four weeks, because of continued pain and limitation of motion, his insurance carrier's consultants advised operation. On April 5, 1926, under nitrous oxide anesthesia this was performed and the tuberosity freed from a bed of fibrous tissue and entirely removed. Figure 3 is a photograph of the removed tubercle. Recovery from the operation was uneventful and the patient left the hospital in three weeks. Twenty-five weeks following the accident, he was examined by the State Compensation Commissioners, who allowed him a permanent partial disability of 15 per cent loss of function of the right shoulder. Lorenz's patient received no treatment and from his description the permanent disability was somewhat greater. In Santee's two patients, replacement of the tuberosity was effected by manipulation in one and by operation in the other, but functional results were not mentioned by him. Personal inquiry concerning these two patients brought no further information because of the death of Dr. Santee.

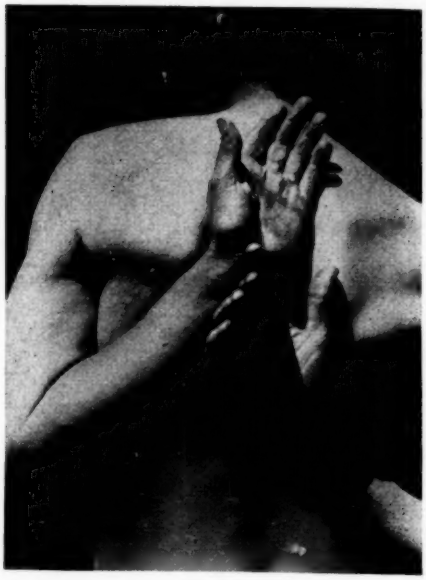

Fig. 4. Photograph showing the limited motion up the back of the hand on the injured side as compared with the opposite hand.

The final result based on the last examination of my patient was estimated in November, 1932. At this time body weight and general physical condition were without change. The injured shoulder was a little smaller than the other and according to a spirit level was about one inch lower. The arm could be raised only a little above the shoulder. The hand could be pushed up the back within six inches of the distance possible with the left, as shown in Figure 4. Lifting was best done with the upper arm against the trunk. Active inward rotation is weak and outward is preternaturally increased by about 25 per cent. In his own words the patient stated, "My shoulder tires easily in any work requiring me to raise my hand above my head, such as painting and driving nails. I cannot shovel or use a pitchfork. My present work is running a power grass-mower. I have no pain."

DISCUSSION

The treatment rendered in this case is recorded. Removal of the loose tuberosity is by no means suggested as a routine procedure in this injury. It is believed that, whenever possible, immediate anatomic replace-

ment of the evulsed process, by closed method or operation when necessary, is the ideal treatment.

The mechanism of this fracture, while open to conjecture, is probably one of extreme stress of the subscapularis muscle as interpreted from the anatomy, the examination, and the history secured from this patient. The case reported by Lorenz supports this contention.

In a personal communication concerning this fracture, Dr. Charles L. Scudder says, "Very little has been written about this type of injury. The separation is ordinarily not great. That position should be maintained that approximates the tuberosity to the shaft most satisfactorily. Operation may, in extreme cases, be considered."

In the case reported, displacement of the tuberosity was very great. At the late date of surgical intervention extensive deposit of fibrous tissue made anatomic replacement impossible. After removal of the tuberosity, the patient had less pain in his shoulder than before.

CONCLUSION

A case of isolated fracture of the lesser tuberosity of the humerus is reported, apparently only the second case to be completely recorded in the literature.

Extreme stress of the subscapularis muscle is advanced as the method of production of this fracture.

The waiter's tray-carrying position is suggested to describe the position of the upper extremity when this fracture occurs. This position was assumed by both the author's and Lorenz's patients.

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2. Jossel. Cited by Hans Lorenz.
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4. Santee, Harold E.: Ann. Surg., 80:103 (July), 1924.

"BAD DRUGS AND THE LAW"

Under the title "Bad Drugs and the Law," Arthur Kallet and F. J. Schlink in the *Nation* for October 19 consider three subjects—"Ergot," "Ether," and "Prescriptions." The article on ergot opens with this statement: "For an extra profit of half a cent, American drug manufacturers have helped dig the graves of thousands of women dead of hemorrhage in childbirth." Kallet and Schlink have apparently swallowed, hook, line and sinker, the preposterous and fantastic publicity which the Ambruster clique has been trying to get into newspapers and magazines for several years. This entire matter was discussed in detail in a special article published in The Journal, September 6, 1930, entitled "Ambruster, Rusby—an Ergot." In reference to ether, Kallet and Schlink say: "Next to its toleration of substandard ergot, we know of no more inexcusable and intolerable abuse of public confidence than the negligence and callousness that have characterized the administration's handling of the problem of impure ether sold to hospitals for anesthetic use." The gentlemen fail to support their charges with any good evidence that any patient has been harmed through the administration of substandard ether. On the subject of "Prescriptions," Kallet and Schlink state, in effect, that because of the small number of prescriptions that many druggists have to fill, drugs that deteriorate by keeping are used "month after month, even for years, until the last drop is gone." However, they do not blame the individual druggist for this state of affairs but do blame the "drug and prescription dispensing system which mixes a minor profession with a major business." That substandard drugs have occasionally been sold and are being sold is doubtless true; probably it will continue to be true, in spite of all that officials may do to the contrary. "Substandard" drugs do not necessarily mean deliberate adulteration; drugs are subject to deterioration, variations of crude supply, and similar influences. Much more can be accomplished by finding means to correct the underlying causes than by attempting the quite impossible plan of having the government check every retail sale at every drug store. Fortunately, the great majority of the departures from the official standards are not of such a degree or kind that they menace the health of the purchaser. (Jour. A. M. A., October 29, 1932, p. 1513.)

ESTROGENIC SUBSTANCES: THEELIN

The Council on Pharmacy and Chemistry reports that the introduction into therapeutics of commercial preparations with active estrogenic properties marked what appeared to be a new phase in the treatment of female sexual disorders. These new preparations, unlike those with which the market had been replete for many years, produced striking and concordant effects when injected into animals. Their clinical use spread widely and rapidly, and observations accumulated in profusion. But the early enthusiasm began to wane as it became evident that the therapeutic usefulness of the estrogenic preparations had been greatly overestimated; the effects of injections in human beings were in the great majority of cases neither striking nor concordant; and in those cases, too few, unfortunately, in which an effort was made to control the observations carefully, the results appeared to be even less notable. Despite their extensive employment, the indications for the clinical use of Theelin and related products are at the present time only imperfectly understood. With a view to establishing, if possible, the indications for and limitations of endocrine therapy of this type, a comprehensive review on this subject was prepared and adopted by the Council for publication. Theelin and related preparations have been used in practically all the special ills the human female "is heir to"; even the male has not escaped. The results in general have been quite disappointing, despite the abundance of case reports available, numbering by now several thousand. The place of Theelin and related products in gynecologic therapy remains for the future to decide. Great caution is necessary in the use of these preparations and greater caution in making deductions from it. The indiscriminate use is likely to do more harm than good, not only because of the effect of the preparations themselves but also because general therapeutic measures intended to aid the organism in restoring its own equilibrium are likely to be neglected. The Council believes that the future of endocrine therapy in the sexual sphere appears quite promising; but so far enthusiasm in this case has in large part seriously interfered with clinical judgment; the clinical use has kept far ahead of the laboratory data; controlled observations have been few indeed. It is time to call attention to the fact that most of the basic facts should first be worked out in the laboratory before they are tried in the clinic. —(*Jour. A. M. A.*, April 29, 1933, p. 1331.)

PRESIDENT'S LETTER

THE Minnesota State Medical Association has just completed the eightieth annual meeting.

This was in point of number in attendance and the amount of scientific material presented the largest meeting ever held by the association. To the committee, Dr. Meyerding and the members of the Mayo Clinic we wish to express our appreciation for this great accomplishment.

Many important matters of medical economics were discussed and some important measures passed by the House of Delegates and the Council, which, I hope, will prove to be forward steps for the profession in Minnesota.

We may congratulate ourselves on the election of Dr. Frank Savage for president in 1934. This was a fitting recognition of his years of unselfish endeavor for the promotion of the welfare of this association, and brings to the head of our organization a man of fine character who is thoroughly acquainted with the complex functions of the society.

Yours truly,

President,
Minnesota State Medical Association.

EDITORIAL

MINNESOTA MEDICINE

Official Journal Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine, and Minneapolis Surgical Society.

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Vol. XVI JUNE, 1933 No. 6

ALCOHOL REGULATION

Public opinion tends to sway back and forth like the swing of a long pendulum. This has been evident in the attitude of the public to the liquor question.

Liquor has been a problem since the beginning of time and will doubtless always be one, simply because of its effect on the human organism and the frailty of human nature.

There is no doubt in the minds of most thoughtful and observing individuals that strong drink causes much of the world's misery. The world would doubtless be better off without it. That is, however, beside the point. Alcoholic drinks are here and many think they have a place. The solution of the problem lies in education combined with a certain amount of control of the liquor traffic in order to minimize its abuse.

The steady growth in public sentiment in favor of local option and national prohibition led to the adoption of the eighteenth amendment. This seemed to be an expression of a realization of the evils attending the abuse of alcohol and a resentment at the methods of the liquor interests typified by the old fashioned saloon. Idealism and war psychology undoubtedly played a part in the adoption of the amendment, which was enacted in spite of the fact that many believed it did not belong in the Constitution and in spite of the opinion of such statesmen as Taft and Wilson that the amendment would be a mistake. As brought out by the economist, Arthur Twining Hadley, late president of Yale University, no law can be enforced unless an overwhelming percentage of the people favor it. A majority is not sufficient. This truth was well illustrated in the Government's efforts at enforcement of the law. The provisions of the Volstead Act placed the medical profession in a peculiar position, although to some it seemed an enviable one. Alcohol may have some definite medicinal value. For various good reasons many physicians never took out a permit to prescribe liquor. The cumbersome method provided for prescribing, the embarrassment attending a strict adherence to the law outweighed to them the need of a permit. That strict adherence to the letter of the law has been more honored in the observance than otherwise is no great reflection on the profession. The profession has been placed in an awkward position. The intemperate use of alcohol aided and abetted by the profession has been only a drop in the bucket compared to that resulting from bootlegging. It is true that certain physicians have prostituted their profession by deliberately selling prescriptions, but such action is frowned upon by the rank and file of the profession.

It has galled certain members of the profession to be told that liquor may be prescribed medicinally but only in dosage approved by legislation. Our national organization has keenly opposed such restriction as a matter of principle. The recent change in regulations is felt to be in certain sense a triumph for the profession although quantitative restrictions have not been entirely removed.

As a matter of fact the opportunities for abuse

of the privilege of prescribing are increased by the new regulations. The word "bar-tender" used to be closely linked with the idea of a drink. The close association of the idea of a prescription and a doctor has come to be frequently in evidence. It looks as though the situation is not improved by the new regulations.

It behooves the profession to tighten up in their prescription writing with the removal of the restrictions on prescription writing. The solution of the liquor problem has not been reached. While there is evidence that the legalization of beer has already diminished the demand for hard liquor, the problem of the control of the consumption of the stronger drinks still awaits solution.

OF GENERAL INTEREST

Dr. J. H. Rishmiller of Minneapolis has returned to his practice after having spent the winter months in Florida.

Dr. Clarence F. Wohlrabe has moved from Springfield, Minnesota, to Minneapolis, where he is located at Normandale Boulevard and 60th Street.

Dr. Charles N. Spratt, Minneapolis, gave an operative clinic before a joint meeting of the St. Louis Ophthalmological Society and the Section of Ophthalmology of the St. Louis Medical Society in April, demonstrating his operations for cataract and glaucoma.

The Saint Paul Hospital, Saint Paul, Minnesota, closed Thursday, May 3, 1933, after the last patient was removed to Bethesda Hospital. The institution was operated by the Norwegian Hospital Society, Inc., and had occupied the present structure, a former convent, for the past twenty years.

Physicians who visit the Century of Progress Exposition at Chicago this summer are invited to call for information or assistance of any kind at the booth to be maintained by the Chicago Medical Society. The Women's Auxiliary to the society will welcome wives and daughters of physicians.

Dr. William C. Bernstein of New Richland, Minnesota, left on May 9 for a three months' post-graduate tour of Europe. He will be a member of the International Post-graduate Assembly, which will visit the leading clinics of Europe, and will later return to London for the Pediatric Congress. During Dr. Bernstein's absence Dr. Richard S. Rodgers of Minneapolis, who has been a resident in medicine at the Minneapolis General Hospital for several years, will carry on the practice at New Richland.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

INDIAN QUACK PLEADS GUILTY

State of Minnesota *vs.* C. W. Brunelle, alias Chief Little Cloud

On March 30, 1933, C. W. Brunelle, alias Chief Little Cloud, sixty years of age, who resides at 118 Fourth Ave. N. E., Minneapolis, entered a plea of guilty to a charge of practicing healing without a Basic Science Certificate before Judge C. M. Stockton in the Municipal Court at Faribault, Minnesota. "Chief Little Cloud" is a half breed Indian (Chippewa) and is employed by the City of Minneapolis as a garbage collector. During his spare moments, and particularly on Saturday afternoons and Sundays, he has been making a specialty of driving down to Faribault to see a number of patients. In the present prosecution he diagnosed the ailment of one Mrs. Hulda Schuemke as bone rheumatism and left some medicine, making a charge of $7.00, which was paid to him in cash. Mrs. Schuemke, seventy-five years of age, is afflicted with arthritis and has not walked for the past fifteen months.

Mrs. Schuemke also was swindled out of $125.00 by "Reverend" Hawkins, who was convicted in the Rice County District Court in September, 1932, on a charge of grand larceny in the second degree growing out of his "healing" activities.

The State Board of Medical Examiners acknowledges the splendid coöperation shown by Miss Ruth Peterson, School Nurse at Faribault, Mr. James Caswell, Faribault City Attorney, Sheriff Haverland and Thomas H. Quinn, County Attorney of Rice County.

MISCELLANEOUS

VAGINISMUS

Spasm of the levator ani muscle, accompanied by pain and closing the vaginal orifice is not uncommon. It not infrequently is caused by conditions not immediately ascertainable.

The following procedure has afforded patients immediate relief of symptoms and has facilitated later study.

Usually the tender area is in or near the fourchette. This is touched with phenol and a small wheal is immediately produced with the injection of 1 per cent procain by means of a fine needle. If done carefully no pain is experienced. Then from this wheal as a center a fan-shaped area in the introitus and floor of the vagina for a distance of an inch is injected with the same solution. The patient experiences relief at once and relaxes. This same area is injected with a 2.5 per cent solution of quinine urea hydrochloride using not over 2 c.c. and spreading it very evenly.

The surface under the injected area immediately becomes anesthetic and remains so for about a month. The small amount of scar tissue resulting is apparently of no moment and does not apparently predispose to future lacerations during childbirth. Normal sensation slowly returns and in the meantime necessary treatment can be carried on.

This method has been used many times and without any undesirable after-effects and gives relief from a disagreeable phenomenon and one frequently a cause of much unhappiness.

O. I. Sohlberg, M.D.

NEOCAINE

One original package of Rachi-Néocaine Corbière (Laboratoires Pharmaceutiques Corbière, Paris; Sole U. S. Agents, the Anglo-French Drug Company, Inc., New York) was submitted to the A. M. A. Chemical Laboratory for preliminary examination. Qualitative tests indicated the presence of procaine base (para-aminobenzoyl-diethylaminoethanol) and chloride. On thermal analysis the specimen was found to be identical with procaine hydrochloride U. S. P. Neocaine appears therefore to be the French proprietary name for procaine hydrochloride. The product has not been submitted to the Council on Pharmacy and Chemistry for inclusion in New and Non-official Remedies. (Jour. A. M. A., January 21, 1933, p. 210.)

OBITUARY

Dr. Norman Dreisbach

1867-1933

Dr. Norman Dreisbach, 65, former head of the old anatomy department at Hamline university, died Saturday night, April 29, 1933. Dr. Dreisbach, who was head of the department before it became associated with the University of Minnesota medical school, died following a stroke suffered Wednesday night. He had been a practicing physician in Minneapolis since 1896.

Graduated from the College of Physicians and Surgeons at St. Louis, Mo., in 1894, he practised two years in Inka, Ill., before coming to Minneapolis.

Surviving him are two sisters and one brother, living in Illinois.

Dr. Emil S. Geist

1878-1933

Dr. Emil S. Geist, fifty-five years old, one of the best known practitioners of orthopedic surgery in the country, died suddenly Sunday, May 14, 1933. Death came shortly after six a. m. at his home, 2904 West River Road, Minneapolis, Minnesota. He expired a few minutes after the arrival of his nurse, Miss Afra Schindler, whom he had previously called.

DR. GEIST

Dr. Geist had just returned from an orthopedic conference in Washington, D. C., Mrs. Geist and one daughter returning by motor.

Born in St. Paul, Minnesota, May 9, 1878, Dr. Geist took his degree as Doctor of Medicine at the University of Minnesota in 1900. After serving one year in St. Joseph's Hospital, St. Paul, Minnesota, as interne, he spent three years abroad in post-graduate work in Paris, Breslau, and Vienna. In Breslau he was associated with the famous surgeon Mikulicz, at which time also the eminent Sauerbruch was connected with the Mikulicz Clinic, and in Vienna he studied with Dr. Adolf Lorenz. Upon his return from study abroad, Dr. Geist entered the practice of orthopedic surgery in Minneapolis, Minnesota, where he practiced until the time of his death. In 1911 he married Miss Augusta Ohage, daughter of Dr. Justus Ohage of St. Paul, Minnesota.

During the World War Dr. Geist was commissioned lieutenant in the Medical Corps of the United States Army. Later he was promoted to captain and then to major. He conducted the schools of orthopedic surgery at Fort Oglethorpe, Ga., and Fort Sam Houston, Texas.

The Hennepin County Medical Society elected Dr. Geist its president in 1928. The Minnesota Academy of Medicine elected him president in 1931. Dr. Geist was a Fellow of the American College of Surgeons. He was a charter member of the International Orthopedic Society, which was organized in London in 1928. He was a member of the Minnesota Pathological Society, the Alpha Kappa Kappa Medical Fraternity, and of the Minneapolis Club.

Since 1928 Dr. Geist had as a partner Dr. Myron O. Henry in the practice of orthopedic surgery. This partnership was dissolved January 1, 1933, at which time he re-entered independent practice.

His survivors are his wife, Augusta Ohage Geist; one son, Justus John; and two daughters, Annamarie and Louise. He is also survived by two brothers, John M. Geist and Dr. George A. Geist, of St. Paul, Minnesota.

Dr. John W. Bell

1853-1933

In the death of Dr. John W. Bell Minnesota has lost one of her oldest physicians, and a man beloved by all with whom he came in contact. For nearly twenty years he had a struggle against ill health but bore it bravely and without complaint. The end of his struggle came on May 16, 1933. It was fortunate that his many friends in the Hennepin County Medical Society, and throughout the State, had learned that on March 18 of this year Dr. Bell had reached the age of eighty years, and friends in the medical profession took this opportunity to express to him by letters, by postal cards, and in many other ways, their appreciation for his service to medicine in Minnesota, and for the fine qualities of his character.

Mrs. Bell, to whom as Kate M. Jones he was married on November 11, 1890, shared with him in this avalanche of tributes.

Reviewing with the utmost brevity that portion of his career of interest to the medical profession, we find that he was born in Butler County, Ohio, March 18, 1853. He graduated from the Ohio Medical College in Cincinnati in 1876, following this with a long period of preparation by post-graduate study in Germany, where at that time many of the leaders in medical thought and research held teaching posts. He began his medical career in Minneapolis in 1882, became Professor of the Theory and Practice of Medicine at the Minnesota Hospital College in 1886, and was made Professor of Physical Diagnosis and Clinical Medicine at the Medical School of the University of Minnesota at its opening in 1888. He was made Professor Emeritus in 1916. Thus during the thirty most active years of his career he played a distinguished part in the training of the many men who passed through the school during that most brilliant period in its development.

He was visiting physician at Northwestern Hospital and consulting physician at Swedish, St. Mary's and Asbury Hospitals. Although his counsel was widely sought he made no parade of his ability. Without lessening in any degree the force of his opinion his tactful and courteous consideration for a fellow physician made him an ideal consultant.

A Democrat in politics, he served in the Minnesota State Senate from 1891 to 1895. He was appointed and re-appointed many times on the Minneapolis Charter Commission.

He was an honorary member of the Minnesota Society of Internal Medicine and had served as President of the Hennepin County Medical Society, of the Minnesota State Medical Association and the Minnesota Academy of Medicine. However, the service which undoubtedly gave him the greatest satisfaction was as the medical member of the Hennepin County Sanatorium Commission for a period of ten years from its inception until his resignation in 1919. On that Commission the value of his counsel was felt from the first and to him is due in very large measure the remarkable development of, and the sound medical policies characterizing, Glen Lake Sanatorium.

As evidence of the esteem in which Dr. Bell was held by his colleagues in Minneapolis, where he had practised for more than fifty years, we take the liberty of quoting from an appreciation written for his eight-

(Continued on Page 443)

A FORUM OF THE COMMITTEE ON PUBLIC HEALTH EDUCATION

Repeal for Doctors

By contrast to the general rush for beer in April there was no "first day" rush for medicinal liquor on Monday, May 8, when prohibition restrictions were at last lifted from the doctor, and liquor for medicinal purposes could be prescribed, again, in unlimited quantities.

Some few druggists in large down-town drug stores, according to the newspapers, attributed the non-appearance of an increased demand to the fact that physicians had not received official instructions regarding the operation of the new law on May 8.

Official instructions were published in the newspapers in ample time in advance, however, for any who wished to take advantage of the first day of license.

It is a credit to the medical profession that the law should have gone into operation without celebration or untoward incident.

There is no doubt whatever that racketeers and bootleggers, deprived of spiked beer revenues, will lay siege to the doctor in the hope of establishing themselves anew in the liquor business. Great will be the temptations held out to those whose prescription will release from bond, whiskey enough to last any patient for thirty days and some for ninety days. There will be schemes for producing fake patients that look government-agent-proof. There will be a chance for the physicians who abused the restricted privileges under former legislation to prejudice the public irremediably against the entire medical profession.

The average physician honestly believes that many of his patients will be benefited by use of whiskey and other medicinal liquors, under direction. He believes still more firmly that the physician should be under no restriction, whether as to medicinal liquor or any other therapeutic agent, when it is a question of doing what he thinks best for his patient. He is further irked by the necessity of filing, for the information of a government office, facts about the patient's health which his ethics demand should remain a confidence between himself and his patient.

Removal of these restrictions is a public recognition of the responsibility and trustworthiness of the medical profession. Abuses of this trust will not occur among the rank and file of physicians.

Beyond any doubt there will be individual violations among physicians. But they will be more deeply resented by colleagues in the profession than formerly when all felt the annoyance of arbitrary and unjust rules. The good name of the profession is at stake now as it never was in the past—as far as liquor violations are concerned. Honest physicians will be justified in watching closely and jealously lest the professional honor of all be smirched.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

MEDICAL BROADCAST FOR THE MONTH

The Minnesota State Medical Association Morning Health Service

The Minnesota State Medical Association broadcasts weekly at 11:30 o'clock every Wednesday morning over Station WCCO, Minneapolis and Saint Paul (810 kilocycles or 370.2 meters).

Speaker: William A. O'Brien, M.D., Associate Professor of Pathology and Preventive Medicine, Medical School, University of Minnesota.

The program for the month of June will be as follows:

June 7—The Heart in Infections.
June 14—Environmental Medicine.
June 21—Cause of Anemia.
June 28—Periodic Health Examination of Men.

AMERICAN PROCTOLOGIC SOCIETY

The American Proctologic Society will hold its thirty-fourth annual meeting in Chicago, Monday and Tuesday, June 12 and 13, 1933. Headquarters will be at the Stevens Hotel. The time and place of meeting will enable members to attend the American Medical Association meeting in Milwaukee, June 12 to 16, and also the Century of Progress exposition in Chicago.

HENNEPIN COUNTY MEDICAL SOCIETY

At the annual meeting of the Hennepin County Medical Society held May 3, 1933, the following were elected to office, terms to begin October 1, 1933:

Dr. C. A. Stewart was elected president, Dr. Martin Nordland was named first vice presiednt and Dr. Olga S. Hansen second vice president. Committee members were named as follows: Dr. R. R. Cranmer and Dr. H. W. Aurand, executive; Dr. D. O. MacDonald and Dr. F. J. Pratt, board of censors; Dr. S. Marx White and Dr. A. T. Mann, board of trustees, and Dr. H. L. Ulrich and Dr. E. L. Gardner, ethics.

Delegates to the annual convention of the Minnesota State Medical Association are Dr. Moses Barron, Dr. Erling W. Hansen and Dr. C. R. Drake, with Dr. J. S. Reynolds, Dr. E. A. Loomis and Dr. Ivar Sivertsen as alternates.

REDWOOD-BROWN COUNTY SOCIETY

The annual meeting of the Redwood-Brown County Medical Society was held at New Ulm, the evening of May 8. The meeting opened with a dinner for physicians and their wives at the Methodist church with Dr. W. A. O'Brien as dinner speaker, his subject "Quacks." Following the dinner the physicians held their scientific and business session at the home of Dr. George F. Reinecke. Dr. O'Brien spoke on Hematology and Dr. R. E. Scammon, Dean of Medical Sciences at the University of Minnesota, on Medical Economics. Mr. T. E. Flinn of Redwood Falls and Mr. Robert Ochs, also of Redwood Falls, discussed collection problems. New officers elected at this meeting were Dr. Albert Fritsche, New Ulm, president; A. P. Goblirsch, Sleepy Eye, vice-president; W. A. Meierding, New Ulm, secretary-treasurer; O. J. Seifert, New Ulm, censor for three years; E. J. Wohlrabe, Springfield, and F. C. Gibbons, Comfrey, delegate and alternate, respectively. The women held a session of the Auxiliary at the home of Mrs. George Weiser.

SAINT LOUIS COUNTY SOCIETY

The St. Louis County Medical Society met at Nopeming Sanatorium Thursday, May 11, 1933. The following program was presented:

4:00 P. M. Clinics, Hart Building

1. Result of the Treatment of Tuberculosis in Adult Patients—Dr. J. G. Lamont
2. Examples of Tuberculosis in Families—Dr. G. A. Hedberg

6:00 P. M. Dinner, attended by members of the Women's Auxiliary.

1. Special Address: The Modern Treatment of Tuberculosis—Dr. E. S. Mariette, Superintendent of Glen Lake Sanatorium
2. Appendicitis and Tuberculosis—Summary of a Series of Cases—Dr. Lincoln Steffens
3. Prevalence of Tuberculosis among Nurses—Dr. Roy Mayne
4. The State-wide Tuberculosis Program—Dr. A. T. Laird.

SOUTHWESTERN MINNESOTA MEDICAL SOCIETY

About forty-five doctors attended this meeting.

The semi-annual meeting of the Southwestern Minnesota Medical Society was held at Lakefield, Minn., Tuesday, May 2, 1933, at 7:30 p. m., at the Masonic Hall.

A short business session was held preceding the scientific program.

"Diverticulum of the Gall-bladder," a case report, was given by Dr. A. L. Pertl, Windom, Minn.

Dr. N. O. Pearce, President of the State Medical Society, presented a talk and a moving picture film on "Diseases of the Nervous System in Children." He also discussed the State Medical Association.

The Auxiliary held a meeting at this time also.

OBITUARY

(Continued from Page 441)

ieth birthday, and printed in the *Bulletin of the Hennepin County Medical Society,* April 10, 1933.

"Those who have had the pleasure of reading William Macmichael's delightful account of 'The Gold-Headed Cane' will remember that this cane first appears in history in 1689, in the hands of Radcliffe, the great London physician, as he is attending a consultation at the illness of King William III. Radcliffe gave the cane to Mead and it passed on then to Askew, Pitcairn and Baillie, who died in 1823. It had thus become a sort of badge of office in succession to the great royal physicians and consultants of London. This cane rests now in a glass case in the Library of the College of Physicians of London, having been deposited in the new building of the College the day before its opening on June 25, 1825. If such a cane could be thought of as a symbol of leadership, and of profound regard on the part of the medical profession for its bearer, we would award it to our Dr. Bell as the royal physician and consultant of Minneapolis and of the State at large as well, and we leave him in possession of this intangible but no less real token of our confidence and esteem, which we hope he and Mrs. Bell may live long to enjoy."

TRANSACTIONS OF THE MINNEAPOLIS SURGICAL SOCIETY

STATED MEETING HELD APRIL 6, 1933

The President, DR. KENNETH BULKLEY, in the Chair.

CONGENITAL CLEFTS AND SCARS FOLLOWING BURNS

DR. HARRY P. RITCHIE, St. Paul (by invitation): The ten beds for Reconstruction Surgery at the University Hospital have been kept pretty well filled, not so much by a large turnover of patients, but because so many of my patients and those of Dr. Waldron and Dr. Leven require long hospitalization and more than one operation. A close study of the general condition of the patient and specific state of the operative field often leads to a postponement of any attack or to some partial or preliminary step.

The cases include congenital defects, the end-results of burns and other injuries of the superficial tissues. Some part of the work may be called cosmetic surgery, but so far this term has been confined to gross deformities due to traumatism or disease. A large part of the work still is in the field of the congenital clefts of the face and jaw.

I present two cases of this deformity, both of them double hare lip and cleft palate. Each case shows all of the possible clefts that may occur. Any other cases would present merely different degrees and combinations of clefts.

The greatest difficulties and the most variable results have been experienced in the alveolar process cleft. What to do for this cleft in the bone has received a great deal of discussion. The several plans of repair are covered by this first case. At the first operation, a section of the vomer and septum was removed near its root, the pre-maxilla was then pushed backwards by thumb pressure and an adhesive strap applied to the face to hold the parts in contact with the lateral processes and splint the vomer. In six weeks or so the pre-maxilla appeared to project as far as it did before this treatment. At the second operation a circumferential wire was applied, removed in four weeks with conditions about the same as formerly. Now is shown a third attempt which is that the front part of the palate has been done on one side by the use of a vomer flap and one side of the double lip done at the same sitting. The result has brought the pre-maxilla in contact with the lateral but at the expense of some rotation of it towards the repaired side. It is my experience, however, that this rotation will be corrected when the other side is similarly repaired. Case 2 presents the same combination of defects, the clefts being much less in degree and so in this case the pre-maxilla was replaced by section of the vomer and the adhesive strap applied with the result that the pre-maxilla was nicely replaced with a minimum amount of damage to the child.

The double hare lips have been operated upon in several ways. The plan of separate attack was used in each of these cases. To do both sides at one sitting is quite an undertaking. I have found it possible to bring the muscle elements of the maxillaries to the midline of the prolabium at each sittnig, so that it is thereby possible to imitate nature's plan of migration of these elements in the formation of the normal lip.

There has been a very definite improvement in the nostrils postoperatively because I have now demonstrated that there is reflection of the lateral nasal process out on the body of the lip in the complete clefts. This reflection covers the upper muscle elements. Unless these elements are exposed by the elevation of this flap, it may become interposed between the right and left muscle bundles. The result is a double width nostril: the flat and flaring ala with which we are all familiar. Since the demonstration of this reflection our nostrils have shown great improvement. In both of these cases the flaps have been turned into the nostril.

The age at which these babies should be operated upon depends upon the alveolar process cleft and particularly upon its degree. It is necessary to apply some force to close it, as early as possible, compatible with the condition of the child. I have recently looked over the charts of a considerable number of babies operated upon and find that the incidence of cleft process is about 72 per cent of all cases. In about one-third of these cases, I have used a wire preliminary to the lip repair or inserted at the same sitting. In the others the lip was done over the cleft with the expectation that its action or the weight of tissue acting on the bones would close the cleft. My experience with the wires is that they can only be considered as preliminary to lip closure. They are not primary agents, but secondary, because as exemplified in the first case, nothing has really happened to the process cleft until the lip was operated upon. So that in every way we are trying to exclude the use of the wires and get these cleft process cases early when it may be possible to close the cleft by thumb pressure, adhesive strap and the early lip repair, as shown in Case 2.

The palate closures are being postponed to late in the second year. Early repair has been urged to provide for the development of normal speech and often these clefts have been attacked at a time when the development of the tissues invites failure. We are paying more attention to seasonal selection of the time of operation and have postponed several cases until the weather moderated and the chance for infections was minimized.

In the review of my series, the soft palate cases showed a 97 per cent primary union. In the hard palate cases the chance of complete success is only two out of three. This comparison of the two clefts shows an enormous difference. I believe this is due to the possibilities of infection in the suture line in the inactive tissues of the hard palate. The hard and soft palate cases therefore are now being often postponed until the age of two years or more.

In several cases of the double hare lip palate, the hard palate has been repaired and the soft palate left for a future attack six to eight months later. Under this program the hard palate line has always healed because there is wide drainage of the space between the flap and the bone. The sequence of operation is much better than the soft palate first and hard palate later. I believe that there is only one cleft that requires early treatment, namely, the alveolar process cleft.

Case 3 is that of a man with contracting circular scars of both wrists following gasoline burns. On the right wrist the scar was very thick, resistant, and so contracted as to produce symptoms both subjective and objective in the hand and fingers. On the left wrist was a similar state but of less degree. I decided to treat the wrists differently. On the left two incisions were made on the back of the wrist. The scar tissue between them was undermined, loosened from the underlying parts and a full thickness skin graft inserted in the cuts with a perfect take. On the right wrist an abdominal flap was mapped out and gradually elevated. The back of the wrist was dissected, the scar tissue removed, the hand inserted under the lower end of the flap, which was sewed to the wrist for about half of its circumference. Later the lower end of the flap was severed from the abdomen, more scar removed and this end sutured in position. When it was evident that the flap was well healed to the back of the wrist

and that the upper end of the flap was obtaining blood supply from the wrist, it was by successive steps severed above. The uncertainty of loss at this distal end led me to simply anchor the flap and apply heat because after such elaborate procedures it is most discouraging to find that some part of the work is incomplete. We had here two methods of treatment, one a very simple but apparently effective method consuming but little time and effort, the other very elaborate and requiring most exacting care.

In Case 4 the left hand was severely burned in an automobile accident. A granulating surface appeared which was covered with a Thiersch graft. The take was complete with tissues movable. The fingers were in extension and it was decided to flex them by cutting the scar tissues on the back of the hand. To fill in the defect a full thickness graft was placed with an apparent take.

PRESENTATION OF A GROUP OF PLASTIC CASES

DR. CARL M. WALDRON and DR. N. LOGAN LEVEN, Minneapolis (by invitation):

Case 1.—Extensive burns of face and hands in a male, aged forty, November, 1931.

A. Restoration of all four eyelids by the overlay method of skin grafting: This patient showed the most extreme ectropion of the lower eyelids I have ever seen. The exposed conjunctiva of the left lower lid extended down upon the cheek for 1.5 inches and the tarsus could not be palpated. The right conjunctiva extended down on the cheek for more than 1 inch. Incisions were made approximately 1 millimeter below the lower border of the conjunctiva and the entire exposed conjunctiva was undercut and hinged upwards to lie against the globe; over the raw surface thus exposed a dental impression compound mold was fitted and a Thiersch razor skin graft was cut and sutured over the raw area. The dental compound mold was again placed in position and held filmly against the graft by means of an adhesive pad and pressure bandage. This procedure was carried out for all four eyelids. In these cases there is a subsequent contraction of the sub-epithelial connective tissue which decreases the height and width of the graft producing a slight recurrence of the ectropion. This usually necessitates a second graft or at times a third. These are usually best inserted between the upper border of the previous graft and the lid margin by again incising and undercutting and fitting a dental compound mold.

B. Transfer of skin from abdominal wall to dorsum of left hand: After excision of scars the hand was slipped under a double ended flap and after the skin had healed upon the hand it was freed from the abdominal wall by delayed incisions in order to make sure of the blood supply.

C. Tube flap carried from chest to left cheek for the purpose of restoring the skin of both cheeks and chin: Stage 1. A skin flap 3.5×11 inches was raised through horizontal incisions. One incision was not carried through for a distance of 2 inches at its midportion in order to provide a blood supply to the central portion of the skin in addition to the blood supplied by both ends of the flap. The flap was sutured on its under surface to form a tube. The margins of the wound on the chest wall were widely undercut and sutured beneath the free flap. About ten days later the midportion of the flap was divided from the chest wall. After two and a half months the lower end of the flap was incised and undercut in several stages to make sure the blood supply was adequate before the transfer to the left cheek. A portion of the scar was excised on the left cheek and the flap sutured. It has united without any complications. Further scars will be excised from the cheek just beneath the new attachment and the flap will be incised and unfolded in order to secure an adequate new blood supply before undertaking the incision and separation of the attachment of the chest. This will be carried out in several stages.

Case 2.—Extensive burns of face, arm, chest, and back—followed by extreme contraction of the right arm at the elbow and anterior-axillary fold with hypertrophic scars in a female, aged twenty-six, December, 1931.

A. Stage I. Scar excision of the hypertrophic scars, undercutting and plastic readjustment of the anterior-axillary fold. There remained a marked deficiency of skin to cover the anterior surface of the elbow and even with quite deep dissection the arm could not be extended normally.

Stage II. The flexion contraction was corrected by manipulation and application of moulded dorsal plaster splints. These were changed at five to six day intervals, five splints being used.

Stage III. Granulation tissue and scars excised from the antecubital space February 23, 1933. A flap was raised from the right side of the body, carried over on to the anterior surface of the elbow and sutured in place. March 23, 1933, following several delayed incisions of the base, the flap was completely separated from the body wall and its margin sutured to the arm.

Case 3. Extensive burns of the face and hands in a female, aged nineteen, December, 1930.

A. A hypertrophic scar over the bridge of the nose was excised and a full thickness skin graft cut to measurement and sutured in position. This was covered by a dental compound mold.

B. Scars on the dorsum of the left hand and fingers were excised and the hand buried beneath the abdominal skin into a pocket undercut as close to the skin as possible. The pockets for the fingers were designed to maintain the fingers as widely separated as possible. The finger tips protruded through small incisions and were steadied by silk worm gut sutures through the finger nails. Beginning two weeks later the skin between the fingers was incised to free the fingers and later the skin on the inner margin of the hand was incised to free the hand. One month after the hand was buried, the skin on the thumb side was incised and the hand freed from the abdominal wall. The abdominal wound was incised and by suturing the defect was diminished. At a later date a thick razor graft was placed upon the granulation tissue with a successful take. Small pinch grafts were also used.

C. Procedure for the right hand was carried out in the same manner; a greater amount of skin being taken to replace the skin of the thenar eminence.

The excess subcutaneous tissue is being removed from time to time from the skin of the fingers and hand in order to assure an adequate blood supply. The function of the hands is much better than before the transfer of the skin and will no doubt improve.

SOME REMARKS ON CARCINOMA OF THE RECTUM AND OTHER TYPES OF MALIGNANCY

DR. WILLIAM T. PEYTON: The two-stage operation for carcinoma of the rectum as described by F. W. Rankin (Surgery, Gynecology and Obstetrics, 53:670-675, November, 1931) is the operation now most frequently used at the Minnesota General Hospital for removal of carcinoma of the rectum. Since this operation was first performed here, approximately sixteen months ago, forty-three patients with carcinomata of the rectum and one with a lymphosarcoma have been examined. Three of these patients had a recurrence following a previous operation for removal. Two others refused operation. In one a colostomy and posterior excision was done. Eleven of the remaining thirty-seven patients were operated upon by the two-stage operation referred to above. The other twenty-six patients were considered to be inoperable. In the recent cases of the series (ten in all), the liver was

visualized by intravenous injection of a 25 per cent suspension of thorium dioxide followed by the taking of x-ray plates of the liver. In six of these cases, metastases to the liver were demonstrated by this means.

Some minor modifications of the operative procedure described by Rankin have been made. High voltage x-ray therapy is given after the first stage operation because it is believed that this should prevent metastases before the second stage of the operation is performed.

There were two postoperative deaths in the eleven patients operated upon. These were both improperly selected for this operation. One died of peritonitis, the other of pneumonia. One other patient has already died of recurrence.

It is important to remove all the perirectal tissues in cancer of the rectum by sharp dissection. This excision should include a wide removal of the perianal skin, the contents of the ischio-rectal fossæ, and all of the posterior part of the levator ani muscle, cutting it at its origin from the arcus tendineus.

Two other cases previously reported before this society were presented. One of these was an hemangioendothelioma primary in the region of the right scapula with pulmonary metastases present when presented before this group a year ago. He received a series of x-ray treatments then and at this time no persistence or recurrence of the lesion can be demonstrated. The other patient was an instance of multiple myeloma in whom only a single lesion involving the sixth thoracic vertebra could be demonstrated in October, 1930, when first examined and treated by laminectomy and radiation. A complete paraplegia which was present at that time cleared up entirely, but in the past few months he has developed multiple painful areas throughout the body. X-ray films demonstrate a most advanced destruction of the various parts of the skeleton by myeloma at the present time.

AMBULANT TREATMENT OF HERNIA

Dr. Arthur T. Bratrud: In presenting a preliminary report of the ambulant treatment of hernias, time will permit only a presentation of a few of the impressions and opinions gained from nearly two years experience with this form of treatment. Whenever this form of treatment has been mentioned, it always conveyed the impression that it was, had been, and is still being done only by quacks. As far as can be determined, the history of this type of work dates back to 1835, when Velpeau first thought of the idea and successfully treated several patients. Among the various types of solutions used from that time, may be mentioned tincture of iodine, tincture of cantharides, fluid extract Querqus Alba, tannic acid, paraffin, zinc sulphate, carbolic acid and alcohol.

A review of the literature on this subject was rather discouraging to any attempt at carrying out this procedure before finding an article by Fraser and Hall of Bellevue Hospital and the New York University, where in 1929 they injected a few hernias and carried out some experimental work on monkeys and dogs. They reported very nice results on these hernia cases. In both the practical and experimental work they used the so-called Pina Mæstro solution, the basic principle of which consists of tannic acid. Reports of their experimental work showed that the indurated area at site of the injection showed a vigorous proliferation of the endothelial and connective tissue cells, plus large mononuclear phagocytes and few foreign body giant cells. There was no necrosis present. There is no doubt in my mind that the injection of paraffin which was so popular about 1880, and is being performed occasionally at the present time, did a great deal to discourage this form of treatment, and caused it to fall into disrepute. About the year 1880, Billroth made the statement that if a solution could be obtained, that caused the artificial proliferation of tissue, the radical surgery of hernia would be solved.

For all types of hernias, the injection treatment is not amenable. Post-operative or incisional hernias usually have adhesions or incarcerated abdominal viscera, without any definite sac, and should not, as a rule, be treated. Incarcerated or irreducible hernias should not be injected on account of the danger of strangulation. This is a distinct surgical condition and should be treated as such. Hernias that can not be reduced and held reduced or where the symptoms cannot be completely relieved by proper application of a truss or surgical. Neither should sliding or direct hernias be considered proper cases for treatment, until we have had further experience with this method. Neither should any hemophiliac or any other case where there is a definite surgical contra-indication be considered for this form of treatment.

Statement has been made that about 12 per cent of all people are suffering from hernias and that 80 per cent of all hernia sufferers are wearing trusses. From our experience, I think it is safe to say that probably one out of ten who wear trusses has symptomatic relief or is properly fitted. One type of truss will not fit all individuals. The most satisfactory truss that we have found is a spring form. When properly fitted this gives relief and is not an inconvenience at any time, regardless of whether the patient is engaged in work, athletic exercise or play. Trusses have usually been fitted too low, and the result is that it has held the hernia contents up, but not within the abdomen. When so fitted, it causes the hernial contents to press out against the fascia of the external oblique muscle and results in a fraying or thinning out of the fascia, as well as an enlargement in the defect in the transversalis fascia. The requirements for any truss are that it remains where it is put, keeps the hernia reduced by a constant, firm and continuous pressure, prevents protrusion of any abdominal contents, and is comfortable. Measurement for a spring truss is taken 2 cm. below the crest of the ilium and down to the symphysis pubis. It is usually necessary to fit a truss several times before absolute comfort and a satisfactory result are obtained. The proper fitting and wearing of a truss requires observation at least every two months to be certain that it is fitting properly. Absolute coöperation of the patient in wearing the truss is absolutely essential. A proper fitting truss should be of no more inconvenience than a well fitting glove after the first few days.

Numerous objections have been mentioned and should be considered. The paraffin injection can be discarded without further discussion. The fact that this type of work has only been in the hands of quacks is not a good argument, as it was not so many years ago that reputable medical men were severely criticized for injection of hemorrhoids or varicose veins and today these procedures are both accepted and recognized. Numerous complications are reported in the literature. These have been reported mostly from the injection of absolute alcohol. As we have had no experinece with this I can say nothing on the subject. Another objection is the fact that a truss must be worn for a long period, but, as I previously stated, a truss is no more inconvenient than a well fitting glove. The truss can be discarded after a period of six months, but in some cases it can be discarded after a shorter period of time than this. Large or double hernias may require a longer period of time. Complications such as hydrocele, epididymitis, orchitis, sepsis, strangulation, peritonitis and abscess have been mentioned, but to date we have had none. There has been a swelling of the cord in a few cases and this has occurred usually toward the end of the treatments, but has caused no serious disability. The production of sterility must be considered, but only time will answer this. As to late strangulation of hernia being more apt to occur, I do think this is possible.

There is a definite technic required in treating these cases which is not difficult to learn, after having seen

a few cases so treated. The number of treatments vary from two to as high as twelve or fourteen. I am skeptical about the large scrotal hernias remaining cured, but to date they apparently are in good condition. The first treatments are given at the internal ring usually at biweekly intervals. As the needle in introduced through the fascia and to the region of the internal ring the tip of the needle can be rotated freely and easily, when in the proper location. The guide for introducing this needle is 1 cm. above the mid-point between spine of the pubis and the anterior superior spine of the ilium. Injections are given at the internal ring, just below the fascia and at the mid-point of the canal. The amount of solution injected varies from two to eight drops of a fluid consisting of Lloyd's Specific Tincture of Thuja 25 parts, alcohol 25 parts, and phenol 50 parts. Injections should be made very slowly, as otherwise pain will result. There is usually slight pain felt for a few seconds after the injection is commenced, but it subsides rapidly. The truss should be worn night and day for the first ten days or two weeks, and then should be worn during the day for probably a period of six months.

The advantage of this form of treatment is that it is ambulant. Complications such as mentioned have not been experienced or substantiated to date. The patient continues working and is not confined to the hospital or incapacitated for a period of six to twelve weeks. As far as statistics show at the present time I believe that recurrences will be fewer than those following operation. The economic side of this form of treatment is very important at the present time. It rescues the mechanical treatment of hernias from the hands of those who know nothing of diagnosis, anatomy, and pathology and little of proper treatment and honest intentions, into the hands of ethical and competent physicians and this is where the mechanical treatment of hernias should be.

A brief résumé of cases treated is here given.

In one hundred and eighty-one hernias in one hundred and forty-one patients, there have been four recurrences. One recurrence was in a man eighty years of age, who had previously been operated upon, and at the beginning of the treatment he had a scrotal hernia which was the size of a large orange. Another was in a patient with a recurrent hernia, who gained twenty-five pounds in weight while in the hospital receiving malaria treatment for lues. Both the other failures were in recurrent direct hernias that occurred after closure of an indirect inguinal hernia. I might mention that one of them developed a left indirect inguinal hernia after closure of the right side and then later developed a small direct hernia on the right side. Injections were repeated in all these cases, and as far as is known, they are apparently cured at present. There was one absolute failure. This was in a short fleshy man seventy-two years of age, who did not adhere to a reducing diet while his truss was being adjusted, and we did not diagnose a direct hernia. A large number of patients are at present under treatment and we are trying to check all of them every two months for at least two years. Patients with contra-indications are referred to the hospital for operation. Very few patients have been refused treatment on account of lack of attention to the proper wearing of their trusses.

CONCLUSIONS

1. The injection treatment is a safe and effective method in eradicating certain types of hernias.
2. Coöperation of the patient in the proper wearing of a truss is necessary.
3. Knowledge of proper fititng of trusses and the technic of the injection treatment is absolutely essential.
4. The occurrence of reported complications has not to date been encountered, except where hernias have been injected in the presence of definite contraindications.
5. The injection treatment of hernia takes the mechanical treatment, when indicated, from the hands of those who know nothing of diagnosis, pathology and anatomy, into the hands of physicians who should know this form of treatment.

THE INJECTION METHOD IN THE TREATMENT OF HERNIA

Dr. Frank S. McKinney, Minneapolis (by invitation): In August, 1931, Dr. Bratrud introduced into the University Dispensary the practise of injecting indirect inguinal hernias supplemented by the wearing of a truss. After several months' use of the method, a number of hernias (including several of the recurrent type) had disappeared without complication or accident. We then decided to investigate the nature of the tissue reaction which follows injection.

The solution was injected weekly for seven weeks into the inguinal region of a dog. Sections were made and examined by Dr. E. F. Bell. They showed the formation of a very fibrous young connective tissue without necrosis, hemorrhage, nor leukocytic exudation. It penetrated adjoining muscles and appeared to be firmly attached to them.

From this report and from the results in patients (diminution in the size of the ring and ultimate disappearance of the hernia) we concluded that the injected material acts as an irritant which produces new connective tissue and thus obliterates the hernial ring. The truss holds the viscera out of the canal during the formation of the scar until it has become firm and strong. The number of injections and the length of time during which the truss must be worn depend upon the age of the patient, the size of the hernia, the character of the tissues about the inguinal canal, and the faithfulness with which the truss is worn.

The following criticisms of the method have been offered: (1) It is a blind procedure; (2) the wearing of a truss is said to make operation more difficult; (3) there is danger of injecting into the bowel, the omentum, the peritoneal cavity, or the large vessels. We have seen none of these complications.

The injection can be made with great accuracy if the location of Poupart's ligament, the internal and external inguinal ring, the femoral artery and vein, and the anatomy of the abdominal wall are kept in mind. Should a recurrence of the hernia develop after the truss has been discarded only a small number of injections are necessary to build up the area where the defect has developed. So far we have not had to resort to operation (to my knowledge) either from inability to complete a cure or because of strangulation while undergoing treatment. I speak of this advisedly and not boastfully.

Speaking before the Interstate Post Graduate Medical Association of North America held in St. Paul in 1925, Dr. Bevan of Chicago said that it is clearly our duty to become very familiar with the use of the truss. The truss is still a means of treating hernia and it is used whether we like it or not in a great many cases. I find among my students and among my younger assistants today the tendency to brush aside the truss, and to pay little attention to it. This is a mistake because in infancy it is curative in more than 50 per cent of the cases.

The usual type of bubonocele offers the most promising indication for this treatment. Very large scrotal hernias (indirect) can be cured provided they are reducible and provided both the surgeon and the patient realize how long a period of treatment will be required. It is but natural to ask ourselves why this method which we have found so satisfactory and free from complications should have fallen into such general disrepute. The answer, I believe, is to be found in the fact that operation for forty years has been so superior to other methods of treatment, while this particular method has rested in the hands of quacks and char-

latans who knew very little of the anatomy, pathology and diagnosis of hernia.

I doubt if this method is applicable to femoral and direct hernias. We have not had a long enough experience (now twenty months) to be able to give you accurate statistics of the number of patients cured (those who have not worn a truss for a year).

In my opinion, the use of this method in the treatment of indirect hernias is safe and will be followed by a successful result in a large number of cases.

AMPUTATIONS FOR DIABETIC GANGRENE

DR. M. H. MANSON, Minneapolis (by invitation): As a result of present day treatment, arteriosclerosis has largely replaced coma as the cause of death in diabetics, and the greater number of deaths among these patients above the age of sixty is explainable by the increase in their longevity. Arteriosclerosis may precipitate a lethal outcome in many ways other than by gangrene, but in event of this complication the surgeon is called upon to exercise his very best judgment and ability.

Gangrene complicating diabetes occurs in about 6 to 7 per cent of cases. This incidence is obtained from the average incidence in 12,037 cases collected from scattered localities, and varies from a low of 3.2 per cent to a high of 18 per cent (Kramer). McKittrick and Root mention gangrene as a contributory factor in 24.2 per cent of diabetic deaths; Morrison, 23 per cent; Rabinowitch, 39.1 per cent; Dublin, 23 per cent (3,386 cases); Kramer, 26 per cent.

We do not wish to enter into the controversy as to whether or not diabetic gangrene is a different pathological process than arteriosclerotic gangrene, but we do subscribe to the attitude that clinically it carries a higher mortality and must be treated with more respect. That this opinion is quite general is attested to by the dictum that amputations in a diabetic should usually be done a joint higher than in a non-diabetic, or that all lower extremity amputations should be thigh amputations. This was undoubtedly arrived at as a result of many sad experiences with post-operative infections and sepsis.

In general in contemplating an amputation, we agree with Kirk, who says, "On the functional value of the stump alone, when properly fitted with a prosthesis, must be based the selection of the site of amputation and the technic of the operative procedure." However, in diabetics, amputation will probably always be a surgical problem for it does not always seem possible to reconcile future usefulness with primary healing and safety.

The procedure to be described is an attempt to fulfill these three considerations more frequently than we have in the past. The technic is not new, being a flapless guillotine amputation described by M. F. Kelly in the *British Journal of Surgery*, April, 1916, and was described before by Kocher and others. In 1930, Urban Maes of New Orleans reported having done approximately sixty cases by this method with only three deaths, these occurring prior to the time of the use of insulin. Two secondary amputations were necessary, one in which drainage was used and one on a patient who had refused amputation for a week after it was advised. There is probably no other such favorable report of leg amputations in diabetics in the literature.

The operative technic is simple, consisting of a circular incision through skin and subcutaneous tissue at the site of election in the leg, *i.e.*, between five and seven inches from the insertion of the hamstring muscles. The skin will retract by virtue of its own elasticity for a distance of a half to one inch. This is aided by pulling from above, but avoiding any undercutting of the skin. The muscles are then cut in a similar manner beginning the incision at the site of the retracted skin. They, in turn, will retract up under the skin for a distance of at least an inch. The tibia is then amputated at the point to which the muscles have retracted. The only dissection that is necessary is to amputate the fibula about an inch shorter than the tibia.

We believe that extraordinary care should be taken to secure perfect hemostasis, care being taken to clamp as little tissue as possible in securing blood vessels. The stump is closed without drainage. It is rather important to avoid the use of a tourniquet, avoid the use of all sharp-toothed retractors, and minimize dissection and retraction as much as possible. The treatment of the bone end and the nerves may be mentioned. It is advisable to bevel the anterior bone edge with the saw and to remove a short cuff of periosteum. Any further procedures such as rasping the edges, etc., are avoided, for, although they may be of value, we believe that the extra time and further retraction that is necessary offsets the benefit. Since Huber and Lewis advocated the injection of alcohol into the nerve ends, this procedure has been generally adopted and is probably the best prophylactic against the formation of neuroma. It is the opinion of those who have had a large experience with amputation of stumps (Kirk) that there is no ideal method of treating the nerve ends; that a neuroma *per se* may give no symptoms unless adherent to scar tissue or so located that it is subject to trauma. For these reasons, if the nerve end has not retracted, it is injected with alcohol. If further dissection is necessary to expose the nerve ends we feel that the trauma to the tissue more than offsets the advantages of injecting the nerves. In the closure only a few sutures are taken through the fascia of the muscles, bringing this over the bone end. The skin is usually closed with metal clips and a firm snug dressing applied.

There have been eight circular amputations done below the knee since the latter part of 1929. Four of these amputations were in diabetics. There has been no hospital mortality. Two cases, one diabetic and one non-diabetic, developed gas bacillus infections in the stumps. In an elderly man of seventy-seven years, in whose stump gas infection was apparent the third day, the stump was opened widely, he was given antitoxin and left the hospital two months later. His general condition was so poor that nothing further was deemed advisable. The other case, a diabetic female of fifty-nine years, was re-amputated on the fifth day. She is in the hospital at the present time and doing nicely.

This procedure, it is apparent, can not be used in every case. All of the available tests and aids in determining the efficiency of the circulation should be used, such as McClure's intradermal saline, the angle of circulatory efficiency, and Moszkowicz' test (except in cases with marked arteriosclerosis and cases with considerable infection). None of these aids, however, determine the amputation site, but are used as additional evidence in forming a judgment as to the arbitrary site chosen. There will occasionally arise the question as to the necessity for planning future usefulness of an extremity stump in a diabetic case, particularly in the most elderly, for Joslin states that two years is the average life span after amputation for diabetic gangrene. However, we have all seen patients who have been up and about for longer periods of time, and should always proceed with the most optimistic view.

OPERATIVE CYSTOSCOPY

DR. C. D. CREEVY, Minneapolis (by invitation): It is a far cry from the first crude instruments of Nitze, made some sixty years ago, to the excellent operative cystoscopes now available; the possibilities inherent in them are still insufficiently appreciated by the portion of the medical profession not particularly interested in urology. It is my purpose merely to call attention to the operations which can be performed with cystoscopes of various types. Many will be inclined to wonder why one should use such expensive instruments for such tedious procedures when the same object can be at-

tained so much more quickly and cheaply (for the surgeon) by open operation. The first argument for the cystoscopic procedure is that its risk is usually less than that of the corresponding open operation; the second, that the avoidance of an incision into the bladder so shortens a given procedure as to give the cystoscopic method an unquestionable advantage.

There is available today such an array of operative cystoscopes as to cause some little confusion. My own preference is for the excellent instrument of McCarthy because of its adaptability. Other instruments, particularly the Brown-Buerger and the lensless instrument of Braasch, are indispensable at times.

Everyone is now familiar with the fact that it is now possible to relieve nearly all obstructing lesions of the vesical neck by some transurethral method, whether that of Bumpus and Braasch, that of McCarthy, or that of Foley. For inflammatory contractures the transurethral method is incomparably superior to open operation. For prostatic hypertrophy the immediate results with all but the very largest glands equal those of operation with definitely less risk. The question of whether recurrence will take place and in what proportion of cases, remains to be settled. In prostatic carcinoma it is useful both in securing tissue for examination in doubtful cases, and for the relief of obstruction, particularly if supplemented by adequate irradiation with radon and with x-rays.

These instruments are also useful in the excision of the occasional papillary tumors which arise in the posterior urethra and project into the bladder. Any good urethroscope may serve to fulgurate the polyps and granulomata of the urethra which sometimes accompany longstanding urethritis.

In the bladder, operative cystoscopes are no less useful. With their aid one can make biopsies of tumors, an indispensable aid in the selection of the proper form of therapy. Suitable tumors (chiefly the papillary variety) can be fulgurated, excised piecemeal with forceps, cut off with snares, or destroyed with chemicals, in particular trichloracetic acid. My own preference is for coagulation of the surface of the tumor, then removal of the coagulated portion with forceps, then repetition until only a coagulated spot on the mucosa remains. If the excised fragment of tumor shows any signs of malignancy, the base should be embedded with radon seeds and x-ray therapy given.

Flat, infiltrating, highly malignant lesions should not be treated cystoscopically because their extent cannot be determined accurately except by palpation.

Foreign bodies and stones in the bladder also come within the province of the cystoscopist. Many of the former can be completely enclosed by foreign body forceps such as the Young rongeur, while others may be seized and extracted with specimen forceps. If the prostate is not too large and vascular or the bladder too contracted, very large stones may be broken up and removed, the softer ones with the cystoscopic lithotrite, the harder with blind instruments of the Bigelow type.

Occasionally small diverticula are so situated that their removal necessitates transplantation of a ureter, or are so small that their excision seems scarcely justified, yet they may cause persistent infection or stone formation. If the bladder wall is of normal thickness, the margin of the diverticulum may be divided with the Collings knife, allowing the diverticulum to flatten out and thus dispose of stagnation of urine. An indwelling catheter is used and the patient observed closely for forty-eight hours after operation.

Not infrequently a localized area of interstitial cystitis (Hunner ulcer) or of encrustation may be benefited or even cured by light fulguration through the cystoscope.

The operative cystoscope is of great value also in dealing with lesions in the ureter. Stones in the lower ureter most frequently demand manipulation, which may take the form of ureteral dilatation, the injection of lubricants, local anesthetics or antispasmodics through the ureteral catheter, or of extraction of the stones by means of special instruments or by entangling them in multiple, twisted ureteral catheters.

Meatotomy by a special ureteral electrode energized by surgical diathermy is useful if a stone is impacted in or above the ureteral meatus; it is of great value also in stricture of the meatus or ureterocele, in which case cure usually follows slitting of the meatus.

Occasionally pyuria and vesical irritation may persist following nephrectomy, especially when a dilated, infected ureteral stump has been left behind. If there is a stricture of the ureteral orifice, drainage may be improved by slitting it with the meatome. When no obstruction exists, it is often possible to obliterate the ureteral lumen by the injection into it of trichloracetic acid, taking suitable steps to protect the bladder mucosa.

To summarize, the judicious use of the various forms of operative cystoscopes does much to diminish the mortality of urological operations, and to shorten the convalescence and hospitalization of the patient, a factor which is of especially great importance at the present time.

THE CLINICAL ASPECTS OF BENIGN TUMORS OF THE STOMACH

Dr. O. Samuel Randall, and Dr. Clayton Beecham, Minneapolis (by invitation): An analysis of twenty-three cases of benign polypi of the stomach was made. The average age of this group was forty-nine. Males outnumbered the females three to one.

In analyzing the symptoms we found that pain in the epigastrium was the principal complaint and was the usual reason for admission to the hospital. This pain was generally described as burning or gnawing in character with occasional crampy sensations. Vomiting, fullness and eructation of gas were other symptoms. Pain was referred in four patients either to the left shoulder or abdomen. Food aggravated the pain in one-third of the cases, while in a like percentage of patients nausea was found with very infrequent vomiting.

It was interesting to note that there was no loss of weight except where some complication occurred such as luetic aortitis, leukemia and hyperthyroidism. Achlorhydria was the most predominant laboratory finding. All but three patients had no free HCl on gastric expression following histamine (5 mg.). Tests for occult blood were positive in seven cases. Blood tinged vomitus occurred but four times. One patient had a positive Wassermann reaction.

The only outstanding physical finding was that of tenderness to palpation in the epigastrium. Seven of our patients presented no physical findings, however.

The x-ray diagnosis of benign polypi was made in all the cases except one in which polypi were found at autopsy. In this instance the patient died of carcinoma of the colon.

We would like to report very briefly two cases which demonstrate the essential features of this paper.

Case 1.—W. B. W., a male, aged seventy-five, was seen in the out-patient department of the University Hospital in May, 1929. X-ray examination revealed multiple polypi of the middle third of the stomach. This patient refused operation, returned, however, to the hospital eight months later with far advanced carcinoma of the stomach with supraclavicular nodes and metastases to the liver.

We feel that an x-ray diagnosis of benign polypi is not warranted except by biopsy, as this patient most likely had malignant areas when first examined.

Case 2.—A man, aged forty-seven, came to the out-patient department of the University Hospital in December, 1928. At this time two benign polypi of the stomach were diagnosed by x-ray. At gastrostomy per-

formed by Dr. Strachauer, the polypi were excised and their bases cauterized. Four years later this same patient came back to this hospital with a far advanced carcinoma of the stomach.

SUMMARY

1. In this review we found that the most common complaint was pain in the epigastrium.
2. The predominant physical finding was tenderness in the epigastrium.
3. The most important feature and that which we are sure had some relationship to the development of malignancy was the high percentage of cases with achlorhydria.
4. X-ray by Dr. Rigler's department sent back in all cases a positive report of benign polypi of the stomach.
5. Two of our patients developed carcinoma of the stomach.
6. By x-ray alone we are not warranted in labelling a polypus of the stomach as benign, because these tumors have a higher rate of malignant degeneration (12-20 per cent) than other so-called benign tumors.
7. One patient diagnosed benign polypus quite likely had areas of malignancy at the time of diagnosis, as eight months later he presented a picture of far advanced carcinoma.
8. A biopsy should be performed on benign polypi of the stomach as well as on other tumors. Excision and cauterization of benign tumors of the stomach and resection of the stomach in the presence of malignancy should be carried out.

THE PREVENTION OF EXCORIATION OF THE SKIN IN INTESTINAL FISTULA WITH THE USE OF YEAST AS A DRESSING

DR. CHARLES H. MEAD, Minneapolis (by invitation): Fortunately the occurrence of gastro-intestinal fistulæ is rather infrequent in the experience of the ordinary physician. When the condition is encountered, however, it becomes exceedingly distressing both to the patient and the attending physician or surgeon.

Such fistulæ may drain from any portion of the gastro-intestinal tract. They may arise spontaneously following trauma or surgical procedures, or they may be purposely created. Material draining from intestinal fistulæ over the surface of the skin may cause considerable irritation, and may even lead to necrosis, gangrene or sloughing. Fistulous material from the large bowel is usually much less irritating than that from the small gut. Intestinal contents from the small bowel are usually extremely digestive and irritating in quality, especially drainage from openings below the level of the ampulla of Vater in which the trypsin content is high. Material draining from the stomach is also highly irritating, its action probably being due to its acid content.

It is not the purpose of this presentation to discuss the etiology or technical surgical treatment of intestinal fistulæ in general, but simply to present a method of treatment of these patients which should add to the armamentarium of the practicing physician and surgeon. Palmer has stated that "The digestion of the skin of the abdomen and back is so rapid and unrelenting as to make the life of the patient a hardship to himself because of discomfort and pain, and to the nursing force because of frequency of needed dressings." The treatment herein recommended is aimed directly at this problem.

Early surgical closure of such fistulæ is usually out of the question. Medication to inhibit the secretion of digestive ferments has accomplished nothing. Attempts to neutralize the digestive action of the intestinal contents have also been futile. Ointments and various solutions have been applied to protect the skin. It is common, however, for a vicious circle to develop wherein the fistula cannot be immediately closed; the intestinal contents digest the skin and underlying tissue, and consequent surgical closure of the fistula is soon impossible because of unhealthy surrounding structures.

It is quite obvious that if the skin and subcutaneous tissues about the fistula could be protected from the digestive action of the intestinal contents that ultimate clean surgical closure would be greatly facilitated. Many methods have been introduced to accomplish this, a few of which have been partially successful. Cheever and Palmer directed a continuous stream of alkali water into the fistula over a period of days with fair results. The method, however, was laborious and sloppy and usually had to be discontinued because of extensive irritation of the surrounding skin from overflow upon it. Cameron, former Assistant Professor of Surgery at this school, became interested in the problem and developed a method of continuous drainage of a fistula by using an electric pump and suction apparatus. The method of Cameron is very satisfactory and is especially applicable in institutional work. It is believed, however, that a more simple and more easily managed type of treatment may be used.

This therapy was first introduced as a purely empiric type of treatment at the Minneapolis General Hospital in the winter of 1931. A case was encountered upon the Child Surgery Service which was under the immediate supervision of Dr. E. A. Regnier, in which an intestinal fistula developed after appendectomy. There was associated irritation, reddening, erosion, necrosis and sloughing of the surrounding skin and underlying tissues due to the action of the contents of the digestive tract. Attempts were made to limit the food intake and secondarily the intestinal content, but this could not be persisted in without impairment of nutrition. The skin about the fistula was covered with zinc oxide ointment, vaseline, a paste made from fullers' earth or kaolin, multiple coats of rubber cement, paraffin, bovinine, mutton tallow and ordinary glue, all without results. Finally on a purely empiric basis, and by chance, a batter of yeast was made and applied with immediate favorable results. It is believed that this case represents the first application of yeast as a dressing for this type of case.

This treatment has since been used at the Minneapolis General and Minnesota General Hospitals quite extensively and with uniformly good results. Whenever the drainage is profuse in amount suction with Sprengel water pump is of course employed in addition. In all probability enough testimonials are available to make the treatment suggest a Fleischmann Yeast project. For this reason mention of the fact that the Fleischmann moist yeast cake is the only one which produces an adequate batter is made with considerable hesitancy. The treatment proper consists simply of making a thick, putty-like batter with yeast cakes and some water, applying it in approximately a one-fourth inch thick layer to the skin surrounding the fistula, and reapplying three to four times daily.

The exact action of the yeast upon the digestive ferments is not clear. Jobling and Peterson have shown that Gram-positive cocci are strongly resistant to trypsin while Gram-negative cocci are quickly digested. Yeasts (Saccharomyces cerevisiæ) are strongly Gram-positive and for this reason may be little affected by the digestive ferments. No other information has been obtained from the literature which might suggest a specific resistance of these organisms to digestive ferments. Chemical analysis of yeast cakes gives no additional information relative to this problem. In the writer's opinion the protective action is simply due to the adhesive quality of the material. Test tube experiments were carried out in an attempt to determine whether or not the yeast might exert an anti-ferment action. Thus, small cubes of egg albumen 2 mm. in dimensions were inclosed separately in yeast batter, vaseline, zinc oxide ointment, kaolin, fuller's earth, mutton tallow, three coats of rubber cement, paraffin and bovinine, and placed in test tubes. Five such series of specimens were

assembled, with a control cube of egg albumen which was unprotected by any coating. One control egg albumen and a series of protected albumen cubes were then covered with gastric juice obtained from a patient by gastric expression. Three other series were covered with material from duodenal, jejunal and lower ileal fistulæ respectively. The last series was covered with pancreatin which had been activated with fresh bile obtained from a patient with a tube in the common bile duct. In each instance the unprotected cube of egg albumen was completely digested within twelve hours. The best protective agents proved to be vaseline, fullers' earth, kaolin, three coats of rubber cement and paraffin. The cubes covered with yeast, bovinine, zinc oxide ointment and mutton tallow were partially digested. Experimentation with the Mett tube also indicated that the yeast had no inherent protective action, as the albumen was digested in each instance in the presence of yeast. Thus the test tube experiment failed to confirm clinical observations, but substantiated the impression that the protective action of the yeast depends largely upon its adhesive qualities.

Yeast has long been recognized as a definite therapeutic agent. The earliest record of its use dates to 1550 B. C. It is recommended in Eber's Papyrus, an Egyptian medical treatise, as a prescription ingredient for constipation. It has also been demonstrated to have definite value in the treatment of boils, acne, rickets, dental caries, pellagra, malnutrition, arthritis and rheumatoid conditions. It has also been used as a local application in douche form for leukorrhea. The writer, however, has failed to find any record of its use as a protective covering for the skin in intestinal fistulæ. Possibilities for its use in allied conditions are evident. Further investigation of the exact mechanism of its action is indicated.

DISCUSSION

DR. E. A. REGNIER: I wish to confirm Dr. Mead's high recommendation of the use of yeast, although he did not let me in on any remuneration he got from the Fleischmann Yeast Company.

I have in mind two cases where Dr. Mead used this yeast dressing. One case was that of a little girl with general peritonitis followed by a fistula of the small intestine and severe erosion of the skin.

A second case was that of a boy eleven years old who sustained severe abdominal trauma with hemorrhage. He subsequently developed obstruction which could not be relieved by nasal catheter. On exploration every loop of bowel was matted together and an enterostomy was done. This closed very slowly and the secretion eroded the abdominal wall.

I feel that Dr. Mead's yeast dressing was a life saving mechanism in both of these cases and I assure you it worked perfectly and made the patients comfortable.

SOME UNUSUAL SURGICAL CONDITIONS OF THE DUODENUM

DR. OWEN H. WANGENSTEEN: Save for the occurrence of ulcer and its complications, lesions of the duodenum are rare. Congenital atresia of the gut, also a very unusual surgical condition, is more frequently observed in the duodenum than in any other similar length of the intestine. The intestine develops as a solid tube and acquires its lumen by a process of vacuolization of the original solid cord. Failure of vacuolar confluence gives rise to stenosis or atresia. One such case has come under my observation. A gastroenterostomy was done but the infant died. Only an entero-anastomotic type of operation will cure the condition. In all instances in which enterostomy has been done a lethal outcome has ensued. Though the condition is commonly described as irremediable, about ten instances of congenital atresia of the small intestine have been saved by operation.

Another obstruction occasionally observed in this section of the gut is the so-called arteriomesenteric ileus, in which the drag of the superior mesenteric artery and the gut which it supplies, leads to compression of the transverse portion of the duodenum near the spine. Not all dilated duodenums by any means are instances of this character. This pull of the mesentery of the small intestine and right half of the large bowel may occasionally play an important role in the so-called post-operative acute dilatation of the stomach. Arteriomesenteric ileus only becomes operative in the supine and erect postures. When the patient is turned upon his face, the gut and its mesentery falls forward and compression of the duodenum ceases. I have once done duodenojejunostomy (first performed by Staveley in 1911), for a patient with a dilated duodenum who had considerable vomiting of long standing. He has been completely relieved through this procedure.

Obstruction is occasionally observed in the duodenum as a result of intussusception of a gastric or duodenal neoplasm (usually benign). Two successful reductions of such invaginations with excision of the offending tumor have been recorded. Such tumors are also occasionally responsible for occult intestinal hemorrhages. A few instances are also on record in which an annular pancreas has obstructed the duodenum.

Failure of rotation of the embryonic mid loop of the gut may result in the entire small intestine lying to the right of the colon. Recurrent attacks of intestinal obstruction of the torsion type in which the unusually mobile duodenum may participate frequently ensue. When the retroperitoneal ascent of the duodenum is complete, normally small anatomic pockets of peritoneum develop in relation with the superior mesenteric artery and its inferior mesenteric vein. Imprisonment of loops of the jejuno-ileum beneath these folds of peritoneum are described as paraduodenal hernias. Intestinal obstruction occasionally occurs as a complication.

Diverticula are not such infrequent occurrences in the duodenum. There is no general agreement as to whether they are of congenital or acquired origin. They are usually observed along the mesenteric border of the duodenum. The description of outgrowths of intestinal epithelium through the muscular coat of the gut along the blood vessels by Lewis and Thyng gives support to the idea that they are congenital in origin. Their infrequent observation in children and the presence of only two intestinal layers, viz., the mucosa and the serosa in the walls of these sacs, strongly support the view that they are of acquired origin.

On the whole it may be said that diverticula of the duodenum rarely give rise to symptoms. Before their recognition by roentgen examination became frequent, their presence was rarely detected during life. Perforations or inflammation in such sacs are decidedly uncommon. They are occasionally observed in connection with gastric or duodenal ulcer and in biliary and pancreatic disease. It is probable that in most instances they aggravate rather than cause alimentary disturbances.

Four patients with duodenal diverticula have come under my observation in whom operation has been performed. In one, a man of fifty-three years (University Hospital No. 41621), a congenital diverticulum possessing all the gut layers on the anti-mesenteric border of the first portion of the duodenum was excised. He subsequently developed a gastric ulcer. In the instance of a neurotic woman of fifty years (University Hospital No. 49524), complaining of pain in the upper abdomen, in whom no other pathological lesion could be demonstrated, I did a transduodenal diverticulectomy (first described by McLean of Winnipeg in 1923), for a diverticulum buried in the substance of the pancreas. There was no striking improvement and in the four years that have elapsed since this was done the diverticulum has either recurred, or another has developed near its site. Another patient, aged forty-two (University

Hospital No. 62320), who had had three previous operations upon his stomach for recurrent vomiting has been entirely relieved by the excision of a large diverticulum from the first portion of the duodenum. A duodenal ulcer was also excised and a partial gastric resection done, followed by a Polya type of anastomosis. A fourth patient, aged sixty-three (University Hospital No. 53159), has a few diverticula of the duodenum that have not been disturbed. I did a gastroenterostomy for him for an obstructive duodenal ulcer in 1926. Three years later he returned because of vomiting. Excision of a segment of small intestine just beyond the stomach containing many jejunal diverticula on the mesenteric border was done. A month later the patient returned again because of vomiting. The efferent loop of the gastroenterostomy had herniated through the stoma into the stomach. It reduced itself spontaneously a few days later. The patient has remained well.

Duodenal fistula is a serious post-operative complication when it occurs. It is most commonly observed after Billroth II types of operations upon the stomach and is usually the consequence of insecure closure of the duodenal stump. When it occurs early in the convalescence, death from peritonitis is almost invariable. Later the problem is one of replacement of the fluids lost through the external fistulous tract and dealing with excoriation of the skin. When the loss of fluid is great, suction furnishes an excellent medium for its collection. Collected fluid may be readministered through a nasal catheter or through an enterostomy tube. The employment of yeast upon the skin serves as an excellent protective agent. When the fluid loss is great, saline must be given in adequate amounts parenterally to insure a good urinary output and avert the well known blood chemical alterations which otherwise would obtain. Duodenal fistulas after gastric resection occurring late in convalescence can be satisfactorily treated by this means.

When the retroperitoneal duodenum is injured as a result of external trauma or in excision of the right kidney in which care is not taken to see that the duodenum is out of the way before the vascular pedicle is clamped, fistula may occur. There being no deviation of the intestinal current, a much more serious state of affairs prevails than when duodenal fistula occurs after gastric resection. One such patient, Mr. H. G., aged forty-eight (University Hospital No. 53272), has come under my observation. A right nephrectomy had been done elsewhere some months previously. The fistula did not develop at once but only after the lapse of a few months. When he was admitted to the University Hospital in 1926, there was a large raw, excoriated area about the size of a large dinner plate in the right loin. Food eaten soon appeared in a relatively undigested state upon the skin. The patient was in extreme agony and had become a morphine addict. The performance of pyloric exclusion materially improved matters, but there was still considerable drainage through the fistulous opening. A direct attack was then made upon the fistulous opening in the duodenum, but its inner borders were so indurated that inversion was impossible. The external fistulous tract was curetted, but without improvement. Three years ago, I mobilized a pedicle flap of muscle from the latissimus dorsi and swung it into the fistulous tract. The wound was slow to heal but the patient has now remained entirely free from this disturbing annoyance for more than two years.

Internal duodenal fistulas are usually the result of spontaneous anastomosis between the gallbladder and the duodenum as the result of a perforation of a large gallstone into the duodenum. Bowel obstruction may follow as a result of impaction of the stone in the lower ileus. These spontaneous fistulas usually have to be undone because such a diseased gallbladder is prone to give rise to cholangitis.

DISCUSSION

DR. A. T. MANN: I have been very much interested in this series of cases which Dr. Wangensteen presented in such a delightful way. There is one experience which I went through which I think might be of interest to you; that is, the obstruction at the duodenum from the arterio-mesenteric pull across the duodenum in connection with postoperative dilatation of the stomach. This constriction by a tightly drawn mesentery across the third portion of the duodenum is the common cause of post-operative dilatation of the stomach.

The first time that I felt sure that at least some of them were due to this was after an operation for a comparatively simple appendix. My patient improved very nicely for the first twenty-four hours and then began to vomit. The area of distention of the stomach increased until it absolutely filled the entire abdomen. The vomitus became the characteristic color of olive green, showing an obstruction below the opening of the common bile duct into the duodenum. We raised the foot of the bed, trying to get the pressure of the pull of that mesentery off the duodenum and did not succeed.

I thought there was no use waiting very long, so after six hours of that and no relief, with symptoms increasing, I thought we might as well "take the bull by the horns," so I took the patient up to the operating room.

This is the interesting situation which we found. The stomach did fill the whole abdomen and the small intestines were entirely in the pelvis. There was not any more than just a string of intestines to the pelvis and the rest were in the pelvis, empty of contents and packed in a hard mass. I could feel the strong pull of the artery and the mesentery over the duodenum. When I came to get those intestines out it took strong digging to get the first loops out. They were not adherent, they were all loose from each other but were tightly impacted in the pelvis. We delivered the intestines out of the pelvis with great difficulty because they were so tightly packed. We sewed up the incision and there was no more trouble.

I feel that very many cases of dilatation are due to that arterio-mesenteric pull which can be relieved sometimes by elevation of the foot of the bed. When not relieved by that the patient should be operated upon and relieved directly.

F. A. OLSON, M.D., *Secretary*.

IRRADIATED SURGICAL ANTISEPTIC

The discovery in medicine of any new technic or process leads promptly to extended research with similar measures. Last year, Eising reported encouraging results by treating purulent wounds with irradiated petrolatum. This report led Ross to test the effects in vitro of such irradiated surgical dressing. Briefly, Ross found that a 2:1 mixture of petrolatum and hydrous wool fat, after ultra-violet irradiation for four hours, had acquired a sufficient bacterial power to kill Staphylococcus aureus and Bacillus pyocyaneus within twenty-four hours. Ross is inclined to attribute the new antiseptic properties to "secondary ultra-violet emanations" held by the petrolatum-hydrous wool fat mixture, a conclusion previously drawn by Eising. There is nothing in Ross's data to suggest a clinical superiority of this unknown "emanation" antiseptic over ordinary commercial antiseptics added to nonirradiated mixtures of petrolatum and hydrous wool fat. Far more extended and controlled researches are necessary before such results are permitted to breed new proprietary remedies. (Jour. A. M. A., October 15, 1932, p. 1356.)

PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

Meeting of April 12, 1933

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club on Wednesday evening, April 12, 1933. Dinner was served at 7 o'clock and the meeting was called to order at 8 p. m. by the president, Dr. C. D. Freeman. There were fifty-four members and one guest present.

The Secretary read the minutes of the March meeting, and these were approved as read.

On ballot, Dr. Arthur E. Smith, of Minneapolis, was elected to Active membership in the Academy.

The Scientific Program was as follows:

DR. F. R. WRIGHT (Minneapolis) reported the following case of "Trichomonas Vaginalis in the Male Urethra."

TRICHOMONAS VAGINALIS IN THE MALE URETHRA

This patient, a forty-seven year old man, was sent to me from Atwater, Minnesota, with a request for help regarding a urethral infection. The patient stated that within twenty-four hours after intercourse with his wife (he denies any transgressions of the moral law) he noticed a tickling sensation in his urethra and a discharge of what he said was pus. Examination of the patient showed the external meatus smeary and plugged with a drop of mucoid secretion. There was no redness about the meatus. Under the microscope this secretion, stained with methylene blue, contained a large number of epithelial cells and comparatively few pus cells. No gonococci were to be found. Urine was voided in two glasses; the first carried some shreds and was slightly hazy, the second was perfectly clear. He had been given a 5 per cent argyrol solution by his family physician, which he had been using three or four times a day. The haziness in the first urine was no more than could be accounted for by the over-enthusiastic use of the argyrol solution.

In talking with this patient, he told me that his wife had had a leukorrhea for years. On questioning her she stated that they have been married twelve years and that she had this leukorrhea before her marriage; that she had been to so many doctors and received so little benefit that she had given up hope of ever being any better. At present she says she has a marked vaginal discharge with a continuous uneasy sensation about her pelvis but that she has grown accustomed to this and pays no attention to it. She refused to submit to an examination.

I asked this man to return in three or four days without using any treatment in the meantime in order that he might get rid of any chemical irritation which might be present. At the same time I asked his wife to take a douche daily using two teaspoonfuls of ordinary baking soda to the pint of the solution. He returned to the office after four days and his first remark was that his wife sent word that the douche had given her more relief than all the treatment she had taken. At this time his meatus was filled with a big drop of mucoid secretion which was carefully collected and sent to the laboratory. The urine was perfectly clear, but contained shreds. Laboratory report showed the presence of trichomonas vaginalis.

The interesting and remarkable thing is the fact that although this couple had been married twelve years and the leukorrhea was present before marriage, this is the first time this man has had any urethral difficulty. Apparently the male urethra is not very susceptible to this infection.

DR. S. E. SWEITZER (Minneapolis) read a paper entitled "Adequate Treatment of Syphilis." Lantern slides were shown. (To be published separately.)

ADEQUATE TREATMENT OF SYPHILIS

SUMMARY

Treatment was outlined as given at the Minneapolis General Hospital, where 396 new cases were seen last year.

The treatment of syphilis should be active and persistent and should continue for at least three years. The time factor is especially emphasized. The treatment should fit the patient and not the patient fit the treatment. Early and long-continued treatment is the only way to prevent cardiovascular, visceral and central nervous system syphilis. Long rest periods are never to be given.

DISCUSSION

DR. PAUL O'LEARY (Rochester) (by invitation): Dr. Sweitzer has covered the field of the treatment of syphilis extensively and it will be possible in the discussion to mention only a few of the many points he made. I believe it is quite essential to re-emphasize the idea that the treatment of early syphilis is still a long-drawn-out procedure. Efforts at the rapid cure of syphilis by the so-called "abortive" measures have been quite unsuccessful in the majority of instances. In a study of a large group of cases of acute syphilis which were treated and observed for several years, it was found that those individuals who had had as a minimum thirty injections of arsphenamine in conjunction with either bismuth or mercury showed the lowest incidence of failures. When the group was studied from the standpoint of the number of injections the patients had received, it was found that the smaller the number of injections of arsphenamine, the greater the incidence of relapse.

In a similar study it was found that the most satisfactory type of treatment, as far as clinical and serologic relapse is concerned, is the so-called continuous system, a treatment program by which the patient is continually under the influence of the arsphenamines and one of the metals for approximately one year. For example, an arsphenamine course of six to eight injections, given at five-day to weekly intervals, is immediately followed by a course of mercury or bismuth of approximately twice as many injections. The second course of arsphenamine is started before the bismuth or mercury is stopped. This continuous type of treatment is carried out until the patient has had a minimum of thirty injections of arsphenamine and approximately sixty of bismuth. The value of bismuth as compared with mercury was also emphasized in this study by the fact that in those patients who received the arsphenamine-bismuth course the relapses, both clinical and serologic, were just one-half those observed in patients who received an arsphenamine-mercury course. It seems definitely established now that bismuth has decided advantages over mercury but that it is inferior to the arsphenamines.

In a discussion of acute syphilis attention must again be called to the fact that neurosyphilis is an accompaniment of acute syphilis, although the neurosyphilis may not manifest itself clinically until many years after the infection has been acquired. In patients with acute syphilis in whom the Wassermann reverts to negative, only to remain negative but a short time before it relapses to positive while the patient is under treatment, the spinal fluid is as a rule positive. In other words, if a spinal fluid examination has not been done in a patient who has a serologic relapse while under treatment for acute syphilis, such an examination should be made and the treatment varied according to the report obtained.

Dr. Sweitzer made one point with which I must disagree, namely, that he had not seen individuals who

had been treated for a period of three years and who had had a relapse. I not infrequently see individuals who have had sixty to seventy or more injections of arsphenamine and a corresponding amount of bismuth or mercury in whom the blood Wassermann and spinal fluid examination are persistently positive. The point to be determined in these cases is whether or not the drugs used are inefficient or whether the individual himself lacks a resistance to the disease. It is my own concept that the latter explanation is the more plausible of the two. This has been called to our attention repeatedly since the advent of malaria therapy. Following the introduction of the arsphenamines, the rôle which the resistance of the individual played in determining the course of the syphilis was lost sight of, but now that we have used the drug for approximately a quarter of a century, the value of the resistance mechanism is again to be considered. It is apparent that some patients with syphilis continue to show evidence of progression in the disease in spite of the intensive administration of the arsenicals and bismuth or mercury. In the same individuals, the use of fever therapy results in a complete serologic reversal in a high percentage of cases. This leads me to the belief that fever therapy is not only the best form of treatment for parenchymatous neurosyphilis of paretic type, but even more important that it is a valuable prophylactic against the development of paresis when the arsphenamines and the metals have failed to control the disease. Since the electric devices for the production of fever have become more popular, the factor of the resistance of the individual patient as the significant item in the course of the disease is constantly before us. Accordingly, it is my suggestion that those patients, in whom the so-called specific remedies have been used intensively but in whom the spinal fluid serology has not reverted to negative, be given fever therapy before the disease has progressed too far. Reports in the literature, particularly from Europe, are re-emphasizing the fact that the measures now in vogue to stimulate the patient's resistance are actually more specific than are the so-called "specific" remedies themselves.

Dr. R. T. LaVake (Minneapolis): There are two gynecologic diagnostic pictures not mentioned here that I would like to bring out in discussion. The first, a massive edema of the vulva without obvious abrasion. I erred in the first case that I saw in my practice. A woman came in complaining of tremendous irritation around the external genitalia due, she said, to an iodine burn brought about by an attempt at abortion by a criminal abortionist. The external genitalia were swollen and gave the appearance of a possible chemical burn. She had a negative Wassermann and no glandular enlargement. I treated her in the hospital and discharged her when the irritation permitted. She later developed a rash and positive Wassermann and treatment was instituted by a syphilologist immediately. I have seen five or six similar lesions since then. In each instance the clinician did not suspect syphilis.

The second picture refers to lesions of the cervix uteri. Do not fail to make darkfield examination of suspicious lesions. I have found several primary lesions in his way. Do not operate, cauterize, or radiate any cervix until you have with reasonable assurance counted out the possibility of syphilis.

Dr. F. R. Wright (Minneapolis): Dr. LaVake has spoken of the condition of the female genitals due to syphilis in which the tissues become thick and edematous, very much like elastic rubber. This is the condition described in German books as edema indurativum. The condition is also occasionally found in the male.

Regarding the treatment of acute syphilis in general this depends entirely on the stage of the syphilis when the patient is first seen. If you can make a positive diagnosis before he has any glandular enlargement in the groin, a certain amount of treatment would be necessary. If he comes with a positive Wassermann and palpable glands in one or both groins, a large amount of treatment would be necessary. If he presents general constitutional syphilis with an eruption on his body, then a still more prolonged treatment would be necessary. In the first case, a positive diagnosis before glandular enlargement and Wassermann, the Germans say that one course of neo-salvarsan is sufficient. They put a course of salvarsan as from five to seven grams given at four-day intervals; therefore, it would be from eight to twelve 0.6 gram doses. If the patient comes with glandular enlargement and with a positive Wassermann he should have two such courses given three months apart. If the patient comes with an eruption all over the body he should be treated at least two years. Wassermann should be made every ninety days on all of these cases until at least a period of three years after infection has elapsed.

In the ordinary course of untreated syphilis, clinical symptoms relapse every three months; therefore, the interval of rest between courses of treatment should not exceed three months.

One can accurately judge the age of clinical symptoms by the character of the symptoms presented. The disease relapses every three months; condylomata lata does not occur until the second relapse, approximately nine months after infection.

In regard to those cases known as Wassermann-fast, Colonel Harrison, who had charge of the venereal work in the British Army during the World War and who is now in London, says that a person who has a Wassermann-fast reaction should be given treatment continuously for two full years.

In giving provocative salvarsan as a test, one should not be satisfied with a single Wassermann. Blood should be taken four days after provocative doses and then at four or five day intervals for at least five or six weeks.

In 1900 I was in Vienna in Neuman's clinic of syphilis and dermatology. Professor Neuman used to teach that there were three types of syphilis (this was in the days before the Wassermann or the discovery of spirochete): (1) one which manifests itself with lesions on the skin; (2) another which manifests itself later in gummata of the bones; (3) and one which develops late lesions of the nervous system.

Dr. C. D. Freeman (St. Paul): I wish to agree with Dr. O'Leary's criticism of Dr. Sweitzer's remark that he had never seen any late manifestations of syphilis in patients who had taken three years of treatment.

I am not going to discuss the ordinary treatment of syphilis because we agree more or less except as to details, and that is, and always will be, a matter of personal opinion.

There is a possibility and even a probability that our treatment plays little rôle in the prevention of some of the late manifestations of syphilis, especially paresis.

To digress a little from the title of the paper, I would like to call attention to an article in the *American Journal of Syphilis* by Dr. Leo Kanner. It is rather interesting and illuminating, because it explains the incidence of paresis from a different viewpoint. He states (as I believe is generally accepted) that syphilis was brought to Europe by the sailors of Columbus from America and that syphilis first made its appearance in Europe about 1494 in Italy and Spain. That the big outbreak came at the time that Karl VIII of France invaded Italy—his army containing many Spanish mercenaries. He shows that general paralysis is not equally distributed among the various nations and that this is not because of racial differences but on account of the time the nation became infected with syphilis. He argues that paresis does not appear to any extent in a nation for about two hundred years after that nation has become infected; that it gradually increases for the next two centuries, and then starts to decline.

In substantiation of these points, among others, he states that the places where syphilis started show the

lowest incidence of paresis among the white nations; that on the African continent, except in countries bordering on the Mediterranean, paresis is almost unknown, while among his brothers—the American negro—it is very prevalent, the American negro having been infected much earlier. In China, paresis is less common than in America, but syphilis is more prevalent.

Among the North American Indians, he says that, after most careful inquiries, at most only eighteen cases are recorded in the last twenty years. They are, as far as we know, the first possessors of this plague, and among them paresis is on the decline, although syphilis is prevalent.

I mention this just for the reason that it may have considerable merit and that our old theories of mental overstrain, alcoholism, etc., so common in the white race where paresis is also more common, may be explained by the theory advanced by Dr. Kanner.

Dr. Kenneth Bulkley (Minneapolis): The educational value of such pictures as shown us tonight by Dr. Sweitzer to characterize lesions of syphilis is great. Many years ago, over a period of some four or five years, I had occasion to see rather large numbers of cases of syphilis with my father, Dr. L. Duncan Bulkley, one of the first dermatologists and syphilologists in this country. In those days the Wassermann reaction had not been developed and I cannot help but feel that, due to lack of laboratory assistance and diagnosis, the powers of clinical observation in the older generation were far better than those of the present generation. Errors in diagnosis of syphilis are made today often because the individual clinician does not trust his own diagnostic ability but depends too much upon laboratory assistance. The point I wish to emphasize is simply that if one clinically is certain that a definite lesion is syphilis, that that case be treated as syphilis irrespective of what the laboratory says in regard to the diagnosis. In other words, I believe that clinical judgment based on experience always has a perfect right to argue with the laboratory on the question of diagnosis.

Dr. H. E. Michelson (Minneapolis): The subject of syphilis is so large and lends itself to discussion so well that one might talk on most any phase of the subject. When an individual is infected with any disease, the first question that we ask is—what is the infection, what type of terrain is it implanted in, and have we any specific treatment?

In syphilis we know that the spirochete is the infector, and, in spite of the many manifestations, experimental syphilis has shown that the spirochete which causes all types is one and the same.

Why do we treat syphilis for such a long time? We must realize that the treatment is directed with the thought that, by keeping the individual under the influence of these drugs for a sufficiently long period of time, we are enabling him to combat successfully the disease. When we keep this in mind, we at once know that we have no index for knowing just how much chemical reinforcement one body needs to successfully overcome syphilis. Therefore, we must keep all bodies under the influence of the drugs for a length of time which experience has shown is sufficient to protect, and maybe cure, a very large percentage of people having syphilis.

In an acute infection for which we have specific treatment, such as diphtheria, we have fairly good guides for the amount of treatment necessary, but in syphilis the nature of the disease makes decision at any one time impossible.

There is no question but that the syphilographer of the pre-Wassermann days was a very astute diagnostician, but after all is said and done, the laboratory is essential for guiding us in the treatment of the disease.

We must also realize that the present-day treatment is a chemical and not a biological treatment and that after we have treated patients for two and a half to three years with chemicals, and we still have evidences of activity, the only thing we have to fall black on is malaria or a similar form of treatment. Hence, we may state that the first two to three years of treatment of early syphilis is chemical, and if decided results are not then obtained, we must turn to malaria therapy.

Dr. F. C. Rodda (Minneapolis): I would like to ask Dr. Sweitzer a question. Given a case of congenital syphilis which has had a thorough treatment with neoarsphenamine, bismuth, and mercury inunction over a period of two years, with a persistent positive Wassermann, what do we have to offer as to prognosis and when should the treatment be terminated?

Dr. Sweitzer (in closing): I will answer Dr. Rodda's question first. The best treatment of congenital syphilis is its prevention. A lot of such patients are hopeless right from the start. We try to treat the mother and prevent congenital syphilis. If you can get them early enough and they are not too overwhelmingly infected when treatment is started, you may get along amazingly well. If we have a patient who comes in and at the end of two years of treatment we find a positive Wassermann, usually that patient has not been started on treatment as an infant. We usually treat those for three years and then if they get along all right and their general health is good we let them go. We have had some of those who have a persistent positive Wassermann after years of treatment. It would be advisable to do a spinal on those before deciding to stop therapy.

In regard to Dr. O'Leary's discussion, I would say that my own experience has been that in cases that have early syphilis you will find a lot of them with positive findings and they will have spirochetes in the blood in the fourth or fifth week, long before the glands are involved. One doesn't know just where to stop. If you take one hundred patients, early cases, and say—give them so much treatment and their syphilis will be cured,—you will find there will be a certain percentage that will not be cured. That is not so good.

To help Dr. Wright out, the condylomata cases I said were a syphilis of from six to nine months, and those early ones were untreated. Dr. Finger, of Vienna, gauged them by their size. Condylomata lata can come fairly early after syphilis. In cleanly patients we do not see them so much.

In regard to Dr. LaVake's remarks, this edema is well known and it is a rather startling thing to see. Ordinarily you can find the sclerosa on the inside of the labia. In regard to the chancre of the cervix, I did not say anything about that for I did not want to embarrass the gynecologists. They sometimes cut them out or treat them with radium and then, after they break out, decide that the patient has a chancre.

As to the question of how long one should treat these patients, I hope some day we will be able to tell just when these patients are cured. Some one mentioned that all cases were not cured at the end of three years. Most of those cases are the type called syphilis maligna precox. That is found in inferior soil, *i.e.*, those individuals who do not have the resistance to throw off the infection. Dr. Freeman has had one case of that, but I did not mention it because it was not my case. When these cases do come in and do not get along so well, I usually interrupt the treatment and give malaria or shock therapy of some kind to develop the resistance of the patient, and then many of them will respond to antisyphilitic treatment. Shock therapy is usually typhoid.

The treatment of syphilis is undertaken by so many men. The eye men see cases of iritis. It should be treated as a systemic disease and treated with the idea that you want to cure the patient. We treat syphilis with the idea of preventing the late sequelæ. The earlier you can get the patient and the more energetic your treatment, the more successful you will be.

DR. C. C. CHATTERTON (St. Paul) gave a talk and lantern slide demonstration on "Extra-Articular Fusion of the Hip."

DR. H. A. H. BOUMAN (Minneapolis) read a paper entitled "Something about Iodine." (To be published later in MINNESOTA MEDICINE.)

R. T. LAVAKE, M.D.
Secretary.

BOOK REVIEWS

Books listed here become the property of the Ramsey and Hennepin County Medical libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

GASTRIC ANACIDITY. Arthur L. Bloomfield, M.D., Professor of Medicine, Stanford University, and W. Scott Polland, M.D., Instructor in Medicine, Stanford University. 188 pages. Illus. Price, $2.50, cloth. New York: The MacMillan Company, 1933.

CERVICO-VAGINITIS OF GONOCOCCAL ORIGIN IN CHILDREN: Report of a project of the Bellevue-Yorkville Health Demonstration, New York City. Walter M. Brunet, M.D., Dora M. Tolle, M.D., et al. 97 pages. Paper. New York: Milbank Memorial Fund, 1933.

LE NYSTAGMUS VESTIBULAIRE. Docteur R. Claoué (Paris). 64 pages. Paper. Paris: Editions Medicales Norbert Maloine, 1933.

DISEASES OF TRADESMEN. Bernardino Ramazzini (1633-1714). Compiled by Herman Goodman, B.S., M.D., New York. SILK HANDLERS' DISEASE OF THE SKIN. Herman Goodman, B.S., M.D. 96 pages. Illus. Cloth. New York: Medical Lay Press, 1933.

WHEAT, EGG OR MILK FREE DIETS. Ray M. Balyeat, M.A., M.D., F.A.C.P. Associate Professor of Medicine and Lecturer on Diseases due to Allergy, University of Oklahoma Medical School, etc. 150 pages. Illus. Cloth, $2.50. Philadelphia: J. B. Lippincott Co., 1933.

DIETETICS FOR THE CLINICIAN. Milton Arlanden Bridges, B.S., M.D., F.A.C.P. Associate in Medicine at the New York Post-Graduate Medical School, Columbia University. 666 pages. Cloth, $6.50. Philadelphia: Lea & Febiger, 1933.

ABORTION. William J. Robinson, M.D. Consultant to the Bronx Hospital, etc. 123 pages. Cloth, $2.00. New York: The Eugenics Publishing Co., Inc., 1933.

ANNUAL REPRINT OF THE REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR 1932. Cloth. Price, $1.00. Pp. 104. Chicago: American Medical Association.

The Council on Pharmacy and Chemistry still carries on its work of informing the medical profession concerning the new medicinal products brought out by the various manufacturers of pharmaceuticals. This volume contains the reports on products considered and rejected by the Council during the past year. Among the reports of special interest are: Amertan, an unoriginal mixture of tannic acid and merthiolate in a water soluble jelly, marketed under a proprietary, uninforming name; Antiopin, a mixture of indefinite composition offered under a nondescriptive, therapeutically suggestive name and marketed in a way that may foster the drug habit; Eubetin, another insulin substitute for oral administration marketed under a proprietary uninforming name with unwarranted claims; Ferro-Copral, a mixture of saccharinated ferric oxide, manganese citrate and copper proteinate proposed for use in the treatment of pernicious anemia and marketed under a proprietary name with unwarranted therapeutic claims; Hepatex P.A.F., a liver preparation proposed for intravenous use and marketed under a proprietary and insufficiently descriptive name with no satisfactory evidence of the safety of its recommended intravenous use; Bi-So-Dol, an unscientific "alkalinizing" mixture offered under an uninforming proprietary name with exaggerated and unwarranted claims of therapeutic usefulness; Gan-Aiden, consisting mainly of the well known ethyl amino-benzoate (benzocaine), a preparation of undeclared composition marketed under a noninforming, proprietary name; Myodin, Subidin, and Sanguiodin, unscientific preparations of iodine marketed with unwarranted claims and indefinite, incorrect statements of composition, under proprietary uninforming names, and Tonikum-Roche (now Elixir Arsylen Compositum-Roche), a "shot-gun" proprietary "tonic" marketed with misleading therapeutic claims.

Besides the reports on rejected articles, the volume contains "Preliminary" and "Special" reports of exceptional timeliness and value: The preliminary report on Thorotrast, a colloidal thorium dioxide preparation proposed for use in retrograde pyelography and for roentgen visualization of the liver and spleen by intravenous administration, is an excellent example of this class of reports. The articles on Nirvanol and Trienthanolamine are also interesting and effective preliminary reports. Among the "special" reports, those on Sulpharsphenamin and Mercurochrome are outstanding. Each report definitively clears up the present status of the drug concerned, the former, on the basis of a questionnaire circulated among leading syphilologists, and the latter on the basis of independent bacteriologic investigation, done by consultants of the Council.

NEW AND NON-OFFICIAL REMEDIES, 1933, containing descriptions of articles which stand accepted by the Council on Pharmacy and Chemistry of the American Medical Association on Jan. 1, 1933. Cloth. Price, Postpaid, $1.50. Pp. 498; lvi. Chicago: American Medical Association.

The annual editions of this volume contain all that the busy physician needs to know concerning the newer preparations which he is daily importuned by the detail men of the pharmaceutical manufacturers to use. The remedies listed and described here have been examined and found acceptable by the Council on Pharmacy and Chemistry, the deliberative body charged by the American Medical Association with the performance of this service for the practitioner, who has not the time or means to make the determinations for himself. Among the new preparations admitted during the past year are: Trichlorethylene-Calco, an inhalation anesthetic proposed especially for use in trigeminal neuralgia; Nostal, an additional barbituric acid compound; Decholin and Decholin Sodium, bile salt preparations for use in functional insufficiency of the liver, the sodium salt being suitable for intravenous use when necessary; Biliposol, Bismo-Cymol, and Iodobismitol, bismuth compounds for use in obtaining the systemic effects of bismuth, especially in syphilis; Triphal, a gold salt proposed for use in the treatment of lupus erythematosus; a number of improved liver preparations for use in the treatment of pernicious anemia; two halibut liver oil preparations of high Vitamin A and Vitamin D content; and Pentnucleotide, the sodium salts of the pentose nucleotides derived from the ribonucleic acid of yeast, proposed for use in infectious conditions accompanied by a leukopenia or neutropenia.

The book contains general articles, descriptive of the classification under which the various drugs are listed. According to the preface, more or less thorough-going revisions have been made of the articles: Arsenic Compounds, Dyes, Iodin Compounds; Liver and Stomach Preparations; Radium and Radium Salts and Silver Preparations.